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Comfort versus Appearance

SOME of the new extra fare passenger equipment that has recently been placed in service seems to show a tendency on the part of the car builders to place greater stress on the scheme of interior decoration than to the details of the fixtures provided for passenger comfort and convenience. A number of complaints have been heard from travellers as to uncomfortable chairs and the small size of the smoking and wash rooms. The seats are said to be too short from front to rear, or there is not sufficient room between the arms, or the back is not high enough to provide a rest for the head. It seems to be the opinion of many travellers that the designers have endeavored

to secure better appearance, and additional baggage and chair space at the expense of the comfort. The appearance of the car is, of course, important but what the passenger pays for, is comfort while travelling. There is no reason why a car cannot have both. The car department can be of considerable service by cooperating with the traffic department in seeing that the fixtures and comfort facilities are the best that can be made available.

Possibilities of Chromium

FOR some time chromium has been employed as an alloy to produce stainless and rust-proof steels. Only a few railroad applications have been made but these have particular significance. Rust-proof steel is used to make headlight cases that will withstand corrosion and chromium iron is being used for locomotive side rods and other heavy forgings because of its combination of high strength and great ductility. It is only recently that practical means have been developed for plating other metals with pure chromium. The cost of this kind of plating varies from 95 cents to \$1.50 per square foot in large quantities and it is now being tried for the plating of headlight and floodlight reflectors. The reflecting properties of chromium are only about 70 per cent as good as those of a silvered glass reflector, but the cost of the glass reflector increases very rapidly with the size and the reflector is much more easily broken. The peculiarly desirable qualities of the chromium plated reflector are that it is not corroded by sulphur fumes or moisture, it is not affected by the heat of the lamp and it is so hard that it can not be scratched by ordinary grinding compounds. Not much has yet been done with chromium alloys and chromium plating, but they would seem to have great possibilities.

Welcoming the New Comers

WHILE the usual hearty welcome is being extended to those who are attending the convention this year for the first time, the important group of newcomers among the exhibitors of transportation equipment should not be overlooked. The manufacturers of motor buses and trucks and of automotive equipment who are this week taking their first official step of initiation into the railway supply trade fraternity are the ones to whom an extra glad hand is extended. In spite of the rather short time that they have had in preparation for assuming their new roles as exhibitors at the largest railway conventions, the bus and truck people have prepared an exhibit that is fully worthy of the convention and of their industry. It is not too much to say that their taking part in the Railway Supply Manufacturers' Association exhibition this year is a significant step in the progress and development of modern transportation. No one denies that buses and trucks are now playing an important part, and will soon play an even more important part, in the transportation scheme of the country. No more does any one claim that buses and trucks will ever supplant the railroads as carriers of the nation's passengers and freight. Rather, it is generally and accurately recognized that railroad passenger and freight trains and motor buses and motor trucks will work side by side in the future, co-operating rather than competing, to furnish a better form of transportation than either one alone can provide, and doing it efficiently and without waste. This

idea of co-operation between railway transport and highway transport is symbolized by the co-operation of the manufacturers of railway transportation equipment and the manufacturers of highway transportation equipment in offering visitors at these conventions the greatest exhibition that has ever been staged.

their high elastic limit, ductility, resiliency and their high safe working load as compared with that of carbon steel would appear to be ideal material for springs.

Multiplying Human Effort

IN A series of syndicated articles now running in the daily press Henry Ford has made this statement: "The only slave left on earth is man minus his machine. . . . The function of the machine is to liberate man from brute burdens and release his energies to the building of his intellectual and spiritual powers for conquests in the fields of thought and higher action. The machine is the symbol of man's mastery of his environment." Two young British engineers, Bertram Austin and W. Francis Lloyd, visited a number of industrial plants in this country to determine the underlying or fundamental reasons for the prosperity of American industry. Among their findings was the following: "The productive capacity per capita of labor can be increased without limit, according to the progress made in time- and trouble-saving appliances." The railways have found many ways in which they could increase the capacity of the plant or operate more economically by utilizing such machines and appliances. There still remain great possibilities in this direction. It must not be forgotten, however, that these appliances and machines must be operated by human beings and that the output of a given machine is decreased or increased in the proportion to which the individual is properly led and inspired. The big question, therefore, is as to whether the same attention is being given to the development and handling of workers as to the mechanical equipment which they control. Is our supervision adequate and do the foremen and supervisors thoroughly understand their responsibility in training and leading the men reporting to them?

Possibilities of Alloy Steel for Springs

SPRING repairs are a large item in the maintenance cost of locomotives and cars. Rolling stock is being made larger and heavier every year, but increased spring capacity is limited by the inability to include in the design enough space for a sufficient number of springs. From the standpoint of design, as the thickness of the spring leaf or diameter of the bar for coil springs increases, the elastic limit decreases. Thus, a spring leaf $\frac{1}{4}$ in. thick will give 90,000 lb. elastic limit, and a leaf $\frac{3}{8}$ in. thick will give 70,000 lb. elastic limit for carbon spring steel. When it is considered that heat treated alloy steels are made that have an elastic limit of 160,000 lb. and a tensile strength of 178,000 lb., the possibilities of increasing spring capacity without increasing the size or weight are great. Two other important factors that determine the life of a spring are ductility and resiliency. A fatigue test was recently run on an alloy steel with maximum fibre stress of 35,000 lb. per sq. in. using the Farmar type of testing machine. Repeated tests averaged well over 20,000,000 revolutions without failure. This test indicates that alloy steel springs can be repeatedly overloaded without serious deterioration. Some of the alloy steels with

The Purchases and Stores Convention

ALARGE attendance at the purchases and stores convention is assured. It looks as though it will be as large a meeting as last year's in St. Louis, when 700 were registered. These annual meetings of railway purchases and stores officers ought to be well attended. The by-laws of the American Railway Association prescribe that "it shall be the duty of Division VI—Purchases and Stores, to consider and report upon methods for purchasing, storing, distributing and selling of materials and supplies." This is no mean function. It is recalled that expenditures in the neighborhood of \$2,000,000,000 are made through the purchasing organizations annually for material and supplies, equipment and fuel. According to statistics presented in last week's issue of the *Railway Age* the purchases by the Class I roads for fuel, materials and supplies alone were \$1,329,000,000 in 1925. These materials are many and diverse. Besides fuel, rail, ties, etc., they include great varieties of smaller articles, such as wire, bolts, spikes, tools, etc. Storehouse stock books show that regular stocks comprise upward of 50,000 different items. These supplies are acquired day by day from diverse sources. In a recent article it was shown that the requisitions for such material reach 30,000 a year on medium sized roads. This material must constantly be received, stored, disbursed and replenished. The details are many and the responsibilities large. Division VI is important in proportion as it causes the handling of purchases and stores to be done with increasing efficiency.

The meeting that begins today is the seventh since the division's formation, and the twenty-fourth since its predecessor, the Railway Storekeepers' Association, was organized. The changes which have taken place in conditions, practices and methods in the supply branch of the railway business during this period have been many and important. This is particularly true of the period since the termination of federal control. Better facilities for storage, better equipment for handling, better organization and better stock control are actualities. These and other improvements are widespread. No one can fail to be impressed with the system with which much of the purchasing and stores work is done, the transformations in facilities that have occurred and the results which have been obtained in reducing investments in supplies held for use.

In a measure the war is responsible for these changes in supply conditions in recent years. Inflated stocks consequent upon erratic deliveries and rocketing prices forced a consideration of supply department needs upon managements. Recognition of the importance of waste prevention as a means of revenue protection has been a great factor in keeping alive interest in this direction.

But there is a significance about the situation in the manner in which these changes have taken place as between different roads and localities. Unit piling of material, for example, has been heralded as a great improvement in storekeeping, but unit piling is not geographically confined. It is everywhere in use or under development. The same is true of the standard stock book. Stores delivery methods and simplification are typical. The remarkable extent to which different roads have in an unusually short time adopted similar practices in conducting

their purchasing and stores work, or to which they disclose an understanding of each other's methods and results is an immediate by-product of neither the war nor high prices.

This uniformity of practice in widely scattered territories attests to co-ordination of effort and of thought in connection with it. Division VI is the chief co-ordinator. It brings supply officers together from different roads. They meet in committees, and the committee's report is only one result of the committee sessions. The annual convention is the common meeting ground of men and ideas. Reports are presented which are profitable either because of giving some information not previously available, or of giving reassurance concerning the efficiency of practices already being used. Acquaintances are made which are far-reaching in their effect. It is evident that these effects are results in a large measure of the work of past conventions of Division VI, and it can safely be predicted that the work of the convention of purchases and stores officers opening today will prove no less valuable. It is significant that in preparation for it 161 railway officers of various positions in the purchasing and stores branch of railway service from 49 different roads have met together repeatedly during the year. Their reports will contain matter for thought and the discussions they will arouse and the addresses which will be heard will warrant study.

Railroad Conditions Still Improving

IN the first issue of the *Daily* published in connection with the conventions at Atlantic City two years ago reference was made to the fact that there had been recently a decline in railway gross and net earnings, but the opinion was expressed that traffic and earnings would soon improve. This prediction was soon fulfilled. There was a large increase of freight business in the second half of 1924 and the total net operating income of that year exceeded that of 1923. In 1925 the freight business and the net operating income of the railways exceeded those of any previous year. In the early part of 1926 there was a slump in the stock market which caused some pessimism among business men. Nevertheless, during the first four months of this year the total traffic and net operating income of the railways exceeded those of the first one-third of any earlier year, and it is believed the same thing was true in May.

There is still some vague apprehension about general business during the rest of this year, but freight car loadings and other conditions and developments seem to warrant the expectation that in point of traffic and financial results the entire year 1926 will be a better one for the railways than any previous year of the last decade. This applies especially to the railways east of the Mississippi river, since the railways west of the river are still suffering as they have ever since the termination of government control, from inadequate earnings. Before the war it was always safe to predict that good railway earnings would result in good business for manufacturers of equipment and supplies. This has not always been true within recent years. While the railways handled the largest freight business in their history last year, their purchases of equipment, and especially of locomotives, were relatively small. At the same time, however, their capital expenditures for improvements in roadway and structures were large.

Orders for locomotives have increased this year, but the equipment manufacturers are still feeling the ef-

fects of failure of traffic to grow as it did normally before the war and of the increase in the efficiency with which equipment is being used, the result being constant surpluses of locomotives and cars which have curtailed purchases of them. In the long run, however, the prosperity of the equipment and supply business does depend upon the prosperity of the railways, and on the whole the prosperity of the railways is steadily increasing. Although all conditions in the railroad and railroad equipment and supply field are not entirely satisfactory, there is much more reason for optimism than pessimism in both these fields.

The Case for Standardization

CONTRARY to the case with respect to goods for general consumption, in which the demand for standardization comes from the producing industries, in the case of freight cars the greatest demand for standardization comes from the railroads which use the cars rather than from the producers who build them. The need for interchangeability of parts commonly requiring renewal at times other than the rebuilding period on the cars of all railroads is by far the greatest argument in favor of standardization of freight car equipment.

The argument has also been put forth that the development of a limited number of standard designs will make possible economies in the building of freight cars, of the same nature as those which make the standardization of many other products of more general consumption so important in other industries. This argument is somewhat lacking in force, however, in view of other factors which interfere with the continuity of car production on a uniform basis and of the comparatively limited extent to which such economies are applicable. To make possible the fullest economies of this kind would require a degree of standardization which would leave little opportunity for the exercise of individual judgment as to types of details in any part of the car structure. To meet the demands of railroads which use the equipment, a degree of standardization that makes possible the interchange of units which in themselves may vary considerably in design would seem to meet the requirements. Many of these features, especially truck details, have been interchangeable on this basis for some time, and with the development of the standard box car designs, others, such as roofs and ends, have been added to the list. The development of standard box car designs is also of value in another direction. These designs furnish the product of the best designing talent on the railroads for the use of all railroads, many of which do not have well-developed engineering organizations. This is not alone of benefit to such roads, but in providing cars of more uniformly adequate strength, the operating conditions on all railroads ultimately will be improved as these designs come into more general use.

The whole case for standardization may be summed up as follows: (1) Interchangeability of unit parts is essential for the most economical maintenance and the least loss of service time with freight cars almost unrestricted in their movement from one railroad to another; (2) complete standard designs of the fundamental structure have the further advantage of effecting a general improvement in the reliability of freight cars under the severe demands of modern freight train service, and (3) complete standardization of all details, without variation, in time may offer possibilities for some economy in cost of car production and in the prices which the railroads must pay for new freight cars. For the present, at least, this last consideration is of little importance.

Today's Program

BOTH the Purchaser and Stores and the Mechanical Divisions of the American Railway Association will hold the opening sessions of their conventions this morning.

Purchases and Stores Division

The seventh annual meeting will open its first session in the Vernon Room of the Haddon Hall Hotel at 9.00 a. m. Daylight Saving Time.

- 9.00 a. m. Meeting called to order by Chairman.
- 9.00 a. m. Invocation.
- 9.10 a. m. Remarks by J. H. Waterman.
- 9.30 a. m. Address by R. H. Aishton, President, American Railway Association.
- 9.45 a. m. Address by W. G. Besler, First Vice-President, American Railway Association.
- 10.00 a. m. Address by Chairman.
- 10.15 a. m. Communications.
- 10.20 a. m. Appointment of Committees (Resolutions and Memorials).
- 10.25 a. m. Action on Minutes of 1925 Meeting.
- 10.30 a. m. Report of General Committee.
- 10.45 a. m. Subject 1.—Stores Department Book of Rules.
- 11.30 a. m. Special Subject—"Bin Tag," by E. D. Toye, General Storekeeper, Central Region, Canadian National Railways.
- 11.45 a. m. Subject 2.—Classification of material.
- 12.00 m. Subject 10.—Materials Purchase Budget.
- 12.45 p. m. Subject 5.—Forest Products.
- 1.15 p. m. Special Subject—"Departmental Meetings"
- 1.30 p. m. Adjournment.

Mechanical Division

The seventh annual meeting of the Mechanical Division will be called to order at 9.30 a. m. (Daylight Saving Time) in the Greek Temple on the Million Dollar Pier. The session will adjourn at 12.30 p. m. The order of business follows:

- Meeting Called to Order.
- Address by R. H. Aishton, President, American Railway Association.
- Address by Samuel Vaucain, President, Baldwin Locomotive Works.
- Address by Chairman.
- Action on Minutes of Annual Meeting of 1925.
- Appointment of Committees on Subjects, Resolutions, Correspondence, etc.
- Unfinished Business.
- New Business.
- Report of General Committee.
- Discussion of Reports on:
 - Nominations.
 - Design of Shops and Terminals.

Entertainment

- 10.30 a. m. Orchestral Concert, Entrance Hall, Million Dollar Pier.
- 3.30 p. m. Orchestral Concert, Impromptu Dancing, Entrance Hall, Million Dollar Pier.
- 4.30 p. m. Tea will be served in Entrance Hall.
- 9.00 p. m. Informal Dance, Special Features, Ball Room, Million Dollar Pier.

Transportation Home

FOR the convenience of all railway and supply men attending the conventions, the Pennsylvania and Pullman companies will place five agents on the Million Dollar Pier near the entrance. They will be prepared to give all desired information concerning railway transportation from Atlantic City to any points throughout the country. Tickets may be purchased or validated or reservations made.

Complimentary Stenographic Service

THE Remington Typewriter Company, 374 Broadway, New York, is providing free stenographic service at Space 4-A on the Million Dollar Pier to A. R. A. members and exhibitors, all of whom are invited to avail themselves of this facility. Eight stenographers are on duty.

Penn State Men to Hold Reunion

ARRANGEMENTS are being completed for a reunion of the graduates, former students and faculty of State College, Pennsylvania, attending the convention. It is requested that all Penn State men attending the convention register at booth No. 1 (the *Railway Age* space). An invitation is also extended to former members of the faculty to register and attend the reunion.

Chicago Specials

THE convention special train over the Pennsylvania from Chicago ran in three sections this year. The departing time from the new Chicago Union Station was 2:05 Monday afternoon and all three sections arrived in Atlantic City at 10 o'clock yesterday (Tuesday) morning. The three sections carried 452 passengers in trains of 12 cars each. In 1924 the two sections of this special train carried 351 passengers, and in 1922 the Atlantic City Special carried 287 people.

The run from Chicago was fast and comfortable. It was without particular incident. The equipment of the three sections was much the same for each section, consisting of club cars, standard Pullmans, dining and observation cars.

Rolling Chairs

THE Transportation Committee will provide rolling chairs for members and guests of the convention wearing official badges, from the following stations, between the hours indicated, from June 9 to June 16 inclusive:

	A.M.	P.M.
The Pier	9:00	to 6:30
Ambassador Hotel	9:00	to 6:00
Marlborough-Blenheim	9:00	to 6:00
Traymore	9:00	to 6:00
Chalfonte Hotel	9:00	to 6:00
Knickerbocker Hotel	9:00	to 6:00
St. Charles Hotel	9:00	to 6:00
	P.M.	P.M.
Grand Ball Evenings only	8:30	to 10:00

Unoccupied chairs may be stopped at any point on the Boardwalk, except between the Marlborough-Blenheim and the Pier, and they may be used in either direction.

Convention chairs are not allowed to wait more than fifteen minutes. The Transportation Committee will consider it a favor if members or guests of the Associations will report to the committee any inattention on the part of an attendant. If the number on the chair is given, it will facilitate checking the complaint.

Registration, American Railway Association

Division V—Mechanical

Acworth, J. S., Supr. Equip., Gen'l Am. Tank, Ritz
Alexander, Walter, President, Union Ref. Transit Co., Brighton
Allison, W. M., Mech. Rep. Car. Serv. Dept., D. T. & I., Iroquois
Allstrand, H. E., Effic. Supvr., C. & N. W., Dennis
Anderson, J. A., Shop Supt., C. M. & St. P., Traymore
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Browning, A. C., Asst. to Sec., A. R. A., Ritz
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Seefeld, W. C., Gen. Blacksmith, S. C., Belmont
Seldon, C. W., S. M. P. D. M. & N., Traymore
Seely, H. N., M. M., I. C., Raleigh
Seidel, G. W., S. M. P., C. & A., Traymore

Seley, C. A., Cons. Engr., Locomotive Fire Box Co., Chalfonte
Selloy, S. H., Gen. Car For., B. & A., Pennhurst
Senger, J. W., S. R. S., N. Y. C., Traymore
Shaffer, C. A., Genl. Supr. Shop Mch. & Tools, I. C., Ambassador
Sheridan, T. F., Ch. Cl. to S. M. P., P. & L. E., Schlitz
Sicardi, E. C., Pres., Union Tank, Traymore
Slayton, C. E., Dist. For. Ret., U. P., Arlington
Smart, G. E., Ch. Car. Equip., Can. Nat., Ritz
Smith, Abram E., V. P., Union Tank, Traymore
Smith, R. P., Mech. Eng., Georgia, Lexington
Souliere, Alfred, Genl. Fore., C. of N. J., Craig Hall
Spangler, P. F., Supvr. Car Repair, St. L. & S. F.
St. Clair, J. T., Eng. Car. Const., A. T. & S. F., Ambassador
Tate, M. K., Mgr. of Service, Lima Loco. Works Inc., Strand
Tatum, J. J., G. S. Car Equip., B. & O., Marlborough
Thomson, Geo. E., M. C. B., N. Y. C., Traymore
Thompson, W. O., G. S. R. S., N. Y. C., Traymore
Thorn, W. H., M. C. B., C. St. P. M. & Ste., Marlborough
Tier, G. F., M. M., A. T. & S. F., Traymore
Toomey, J. J., Trav. A. R. A. Insp., A. & W. Pt., Lexington
Von Bergen, E., I. C., Breakers
Waddy, G. M., Genl. For., Erie, Pennhurst
Wagstaff, Geo., Aff. Mem., Chalfonte
Wallis, J. T., Chief of Mo. P., Penn., Brighton
Wahlen, John, S. M. P., Mont. & Wells River, Arlington
Webster, John M., Shop Supt., M. K. & T., De Ville
Westaff, W. T., M. C. B., N. Y. C., Ritz
Winter, P. G., Mech. Asst. to G. S. M. P., C. M. & St. P., Ritz
Withrow, P. C., Mech. Engr., D. & R. G., Traymore
White, C. A., Shop Supt., A. C. L., Haddon Hall
Wildin, Geo. W., G. M., West. A. B., Chalfonte
Wink, L. R., Asst. Supt. Car. Dept., C. & N. W., Iroquois
Woods, G. D., Shop Supt., A. T. & S. F., Princess
Woodworth, Edward A., Ajax Hand Brake Co., Shelbourne
Wright, C. B., Asst. to Chairman, Div. A. R., Ritz
Wymer, Chas. J., Supt. Car. Dept., C. & E. I., Ritz
Young, C. B., Gen. Mech. Eng., C. B. & Q., Traymore
Zwight, Silas, Genl. Mech. Supt., Nor. Pac., Ambassador

Division VI—Purchases and Stores

Baker, G., G. S. K., F. W. & D. C., Devonshire
Bechlmeir, G. W., G. P. A., U. P., Traymore
Beggs, John H., P. A., C. & E. I., Marlborough
Bogan, J. E., D. S. K., Mo. Pac., Breakers
Carr, Geo. A. J., Dist. S. K., C. M. & St. P.
Carroll, H. R., D. S. K., C. & N. W., Chalfonte
Cartwright, C. C., Trav. S. K., C. & N. W., Haddon Hall
Cherry, C. P., Genl. Matl. Supv., Penna., Iroquois
Cockrill, J. V., D. S. K., I. C., C. Crest
Daniels, O. V., G. S. K., Penna.
Davidson, W., G. S. K., I. C., Traymore
Farrell, W. J., Sec., A. R. A., Chalfonte
Finlayson, C. S., Asst. P. A., C. M. & St. P., Chalfonte
Foster, C. M., D. S. K., Mo. Pac., Breakers
Goodchilde, W. W., G. S. K., C. P., Haddon Hall
Green, L. J., A. G. S. K., N. Y. C., New Iroquois
Hansen, J. J., D. S. K., U. P., Ambassador
Hickey, W. P., Dist. S. K., N. Y. C., Ambassador
Jackson, R. R., D. S. K., Wab., Breakers
Johnson, A. C., D. S. K., No. Pac., Haddon Hall
Kelly, J. T., G. S. K., C. M. & St. P. R. R., Haddon Hall
Kenzel, C. H., P. A., E. J. & E., Chelsea
Knight, W. A., Asst. Lumber & Tie Pur. Dept., I. C., Dennis
Kroul, L. M., S. K., C. & O., Knickerbocker
Laughton, Hunter H., Asst. to V. P., So. Ry. System, Traymore
Lieber, Geo. W., Supt. Recl., M. K. T., Ambassador
Livingston, J. B., Dist. S. K., Can. Nat., Chelsea
McCormick, Chas. C., Insp., P. R. R.
McDonnold, K. A., C. C. to P. A., K. C. Sou., Shelbourne
McKeand, C. H., Tres. & P. A., T. T., Craig Hall
McKelligon, A. S., G. S. K., So. Pac., Traymore
Mackie, C. J., S. K., C. B. & O., Apollo
Marceau, J. E., G. S. K., Rutland, Chalfonte
Marshall, C. A., Stores Insp., Wab., Breakers
Marshall, J. F., P. A., C. & A., Traymore
Morehead, W. S., A. G. S. K., I. C., Dennis
Peck, F. S., D. S. K., C. M. & S. P., Haddon Hall
Porter, E. A., Dist. S. K., M. P., Breakers
Reinehr, John, Dist. S. K., C. M. & St. P., Haddon Hall
Roberts, E. G., D. W. S. K., C. R. I. & P.
Sauls, C. B., D. S. K., I. C., Dennis
Schultz, O. A., Ch. Lumber Insp., C. & B. & Q., Rittenhouse
Seyfarth, E. E., G. S. K., Belt Ry. Co. of Chicago, Breakers
Singleton, A., P. A., H. V., Brighton
Smith, G. C., P. A., U. P., Marlborough
Spuhler, A. J., D. S. K., Ch. & N. W., Haddon Hall
Stuart, J. G., G. S. K., C. B. & Q., Haddon Hall
Studer, L. L., Insp. Stores, Mo. Pac., Ambassador
Thompson, C. H., Dist. S. K., So. Pac., Ambassador
Tobey, C. B., G. S. K., L. V., Strand
Vail, Moses, Gen. R. D. S. K., N. Y. O. & W., Breakers
Walder, G. H., Pa., C. M. & St. P., Traymore
Walters, A. E., D. S. K., I. C., Carolina Crest
Warne, C. C., Asst. P. A., N. Y. C., Traymore
Waterman, J. H., Supt. Timber Pres., C. B. & Q., Haddon Hall
Young, C. D., Store Mgr., Penna., Brighton

Special Guests

Amer, H. J., Stockman, W. J. & S.,
Black, W. C., Elec. For., C. of Ga.
Burke, Glenn, Assist. Ch. Cl. S. M. P., C of Ga., Arlington
Crippen, F. L., Elec. N. Y. C., Traymore
Ellwood, T. B., Tool Room For., T. & P., Craig Hall
Mallory, C. E., Supt., Kingan Ref. Line, Traymore
Moll, John B., Asst. Loco. Insp., P. & R., Worthington
Rice, N. W., Eng., S. P. & S.
Tracy, T. J., Div. Car. For., Erie, Pennhurst
Wilson, La Verne, Ritz



D. L. EUBANK



S. G. DOWN



L. B. SHERMAN



G. T. JOHNSON



H. E. DANIELS



A. ALLAN



W. K. KREPPS



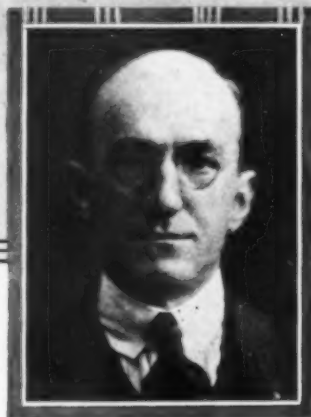
S. H. CAMPBELL



G. E. RYDER



G. A. COOPER



C. H. GAYETTY



G. W. DENYVEN



C. C. CASTLE

Members of the Executive Committee, Railway Supply Manufacturers' Association



W. H. S. Bateman
Vice-President



Leroy S. Wright
President



J. D. Conway
Secretary-Treasurer

Officers of the Railway Supply Manufacturers' Association

Railway Supply Manufacturers' Association

*Demand for exhibit space forces the organization to erect
special structures near Million Dollar Pier*

THAT the uncertain conditions which obtained during the war and post-war period were ably coped with by the Railway Supply Manufacturers' Association is indicated by the rapid extension and development of the exhibition during recent years. Had not the association been established on a sound basis and most ably officered, it would have gone down under some of the difficult problems with which it has had to contend. No greater testimonial of the need of such an organization and the increasing value of its work can be found than in the remarkable success of the exhibition in recent years. This is evidenced in one way by the growth of the exhibit, which is touched upon more fully on another page. In passing it may be said, however, that not only is it significant that the Purchases and Stores Division and the Association of Railway Electrical Engineers have scheduled their meetings during the convention of the Mechanical Division, but this year there will also be an informal gathering of a considerable number of railroad representatives who are interested in the problem of motor truck and bus transportation.

For those who have not followed the conventions closely or who have not looked into the work of the Railway Supply Manufacturers' Association, it may be said that that organization provides the exhibit, looks after the registration or enrollment, has charge of the entertainment and recreation features and supervises the use of the rolling chairs.

The Officers

The officers include a president, vice-president, secretary-treasurer and an executive committee.

Leroy S. Wright, the president of the association, is associated at Chicago with the railway sales department of

the National Malleable & Steel Castings Company. He has had an interesting history, but not the kind that makes a long newspaper story. He is a hustler, but has been emphatically a man of one job. He entered the employ of what is now the National Malleable & Steel Castings Company at Sharon, Pa., October 1, 1900. Incidentally, he was born and raised in Sharon. He was appointed to his present position with the Chicago office in 1907.

Wright says he quit school at 14, and barring a few of the small lines of enterprise in which active boys engage before they find an opportunity to take up a permanent position, the educational experience he has been accumulating has been directed largely along the lines of his regular employment. He has found time, however, to devote a considerable amount of his surplus energy to the work of the Railway Supply Manufacturers' Association. Since 1914 he has been represented on convention committees whenever there have been conventions, and in 1919 he became a member of the Executive Committee as one of the representatives of the fifth district. He was elected vice-president of the association in 1922 and two years ago was elevated to the presidency. The activities of the Executive Committee under Mr. Wright's leadership are only partially represented by the increase in exhibit space from about 103,000 sq. ft. to 146,000 sq. ft., as provided this year. The facilities for and convenience of the exhibitors have been improved in many ways and there are important plans under consideration to provide for the future growth. Mr. Wright has had a hard-working committee and his own capacity for inspiring enthusiastic work has had a large influence.

W. H. S. Bateman, more familiarly known as "Doc" Bateman, is vice-president of the association. "Doc" has done yeoman's work in the R. S. M. A. and in 1924 was

chairman of the Exhibit Committee. He makes his headquarters in Philadelphia and represents the Parkesburg Iron Company and the Champion Rivet Company.

John D. Conway, the secretary-treasurer, has his office in Pittsburgh and looks after the detail work of the association. Incidentally, he is also secretary of the Railway Club of Pittsburgh and was a charter member of that club.

The Executive Committee

In addition to the president and vice-president, there are 13 members on the Executive Committee, representing eight geographical districts. The members of the Executive Committee and the districts they represent, are as follows:

First district (New England states) one member: George W. Denyven, of George W. Denyven & Co., Boston, Mass.

Second district (New York and New Jersey) three members: Charles C. Castle, American Car & Foundry Motors Company, New York; W. K. Krepps, Crucible Steel Company of America, New York; and Gilbert E. Ryder, The Superheater Company, New York.

Eighth district (Canada) one member: Arthur Allan, The Holden Company, Ltd., Montreal, Canada.

Exhibit Committee

The work of the Exhibit Committee speaks for itself in no uncertain terms. Details concerning its accomplishments will be found in an extensive article elsewhere in this number. This year it was confronted with problems of no mean proportions and it is to be heartily congratulated upon the way in which it has met the rather severe requirements. The members of the Exhibit Committee are drawn entirely from the Executive Committee of the R. S. M. A. and include Gilbert E. Ryder, chairman, S. H. Campbell, George W. Denyven, D. L. Eubank and George T. Johnson.

Enrollment Committee

The Enrollment Committee works under intense pressure, particularly during the early part of the conventions. Nowhere is patience and courtesy of greater importance than in greeting and registering the members of the vari-



George C. Hannaway
Chairman, Transportation
Committee



George T. Cooke
Chairman, Entertainment
Committee



Arthur Haller
Chairman, Enrollment
Committee

Third district (Pennsylvania) two members: Charles H. Gayetty, Quaker City Rubber Company, Philadelphia, and S. G. Down, Westinghouse Air Brake Company, Wilmerding.

Fourth district (Ohio, Indiana and Michigan) two members: George A. Cooper, Frost Railway Supply Company, Detroit, Mich., and George T. Johnson, The Buckeye Steel Castings Company, Columbus, Ohio.

Fifth district (Illinois) two members: H. E. Daniels, West Disinfecting Company, Railroad Department, Chicago, Ill., and L. B. Sherman, *Railway Age*, Chicago.

Sixth district (Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, Georgia, Florida, Alabama, Mississippi, Kentucky and Tennessee) one member: D. L. Eubank, Galena Signal Oil Company, Atlanta, Ga.

Seventh district (states west of the Mississippi river, including Louisiana, Minnesota and Wisconsin) one member: S. H. Campbell, Western Railway Equipment Company, St. Louis, Mo.

ous associations and their guests as they come to the Million Dollar Pier. To keep the members of the Enrollment Committee in good condition and a cheerful frame of mind, the task is handled by a carefully worked out schedule whereby the committee is divided into shifts. This committee is also charged with the publication of the enrollment lists. This involves a vast amount of detail work, but obviously with such a large number of people in attendance at the conventions, it is not only a convenience, but a great practical help to the success of the meetings. The members of the committee are as follows:

Arthur Haller, Chairman, American Locomotive Company, Chicago.
J. E. Brown, Vice-Chairman, O'Malley-Beare Valve Company, New York.
A. B. Edge, Detroit Graphite Company, Atlanta, Ga.
F. C. Koch, *Railway Age*, New York.
F. E. Dodson, United States Rubber Company, Baltimore, Md.
H. V. McKedy, The Patterson-Sargent Company, New York.
W. R. VanSteenburgh, The Okonite Company, New York.
H. K. Williams, Safety Car Heating & Lighting Company, New York.
R. J. Himmelright, American Arch Company, New York.
E. E. Thulin, Duff Manufacturing Company, Chicago.
F. L. Johnson, Pressed Steel Car Company, Chicago.

P. B. Miller, Walworth Company, Boston, Mass.
 M. K. Tate, Lima Locomotive Works, Inc., Lima, Ohio.
 W. H. Dickinson, Railway Review, New York.
 Edward Wray, Railway Purchases & Stores, Chicago.
 P. E. Raymond, Wm. Sellers & Company, Inc., Chicago.
 H. L. Burrhus, New York.
 B. J. Wilson, Pocket List of Railroad Officials, Chicago.
 A. D. Stuver, Gold Car Heating & Lighting Company, Chicago.
 John E. Leonard, Pittsburgh Plate Glass Company, New York.
 H. H. Melville, *Railway Age*, Cleveland, Ohio.
 J. A. Walsh, Railway Review, Chicago.
 A. N. Willsie, Locomotive Stoker Company, Chicago.

Entertainment Committee

The railway men at the conventions lead a rather strenuous life attending the technical sessions of their respective organizations and studying the exhibits. One of the important practical advantages of these great conventions is the fact that men from all over the country have an opportunity of coming together and getting acquainted. The Entertainment Committee is charged with providing a certain amount of recreation in the interests of promoting acquaintanceship and good fellowship. The members of the committee are:

George T. Cooke, Chairman, American Railway Products Co., New York.
 Floyd K. Mays, Vice-Chairman, The Bradford Corporation, New York.
 D. R. Arnold, Union Metal Products Company, Chicago.
 S. L. Bateman, Parkesburg Iron Company, Philadelphia, Pa.
 W. F. Bippus, The Joyce-Cridland Company, Dayton, O.
 J. P. Bourke, Ewald Iron Company, New York.
 C. L. Brown, Manning, Maxwell & Moore, Inc., Chicago.
 J. J. Cizek, The Leslie Company, Lyndhurst, N. J.
 C. W. Floyd Coffin, Franklin Railway Supply Company, New York.
 J. W. Coleman, Consolidated Equipment Company, Ltd., Montreal, Can.
 Scott Donahue, New York.
 H. J. Downs, American Locomotive Company, New York.
 A. N. Dugan, Bronze Metal Company, New York.
 J. W. Fogg, MacLean-Fogg Lock Nut Company, Chicago.
 George L. Gordon, Lukens Steel Company, Coatesville, Pa.
 Oscar C. Hayward, Williams-Hayward Company, Chicago.
 W. A. Hicks, Pennsylvania Iron & Steel Company, Creighton, Pa.
 Langley Ingraham, Lowe Brothers Company, Dayton, O.
 Arthur G. Johnson, Armspear Manufacturing Company, New York.
 Webb G. Krauser, Union Draft Gear Company, Montreal, Can.
 L. J. McCombs, Patterson-Sargent Company, Boston, Mass.
 P. L. Maury, Detroit Graphite Company, Detroit, Mich.
 L. K. Morrison, Galena-Signal Oil Company, Atlanta, Ga.
 A. D. Morrow, Standard Coupler Company, New York.
 C. R. Naylor, The Symington Company, Chicago.
 H. C. Naylor, Railway Steel-Spring Company, Chicago.
 P. G. O'Hara, Duff Manufacturing Company, New York.
 H. A. Pastre, Elliott Company, Pittsburgh, Pa.
 Leslie R. Pyle, Locomotive Firebox Company, Chicago.
 Joseph A. Renton, Kerite Insulated Wire & Cable Company, New York.
 Lewis B. Rhodes, Vapor Car Heating Company, Washington, D. C.
 J. L. Rowe, Chicago Pneumatic Tool Company, New York.
 F. O. Schramm, Pressed Steel Car Company, New York.
 F. E. Symons, Ralston Steel Car Company, Columbus, O.
 R. P. Townsend, Johns-Manville, Inc., New York.
 J. H. VanMoss, Pennsylvania Car Company, New York.
 H. A. Varney, Distance-Speed Recording Company, Chicago.
 F. W. Venton, Crane Company, Chicago.
 J. R. Wetherald, Champion Rivet Company, Philadelphia, Pa.
 S. B. Wight, Jr., Standard Steel Car Company, New York.
 R. W. Williams, American Brake Company, St. Louis, Mo.

Transportation Committee

Those attending the conventions who wear official badges are entitled to the free use of rolling chairs during certain periods of the day. It is the task of the Transportation Committee to look after the operation and assignment of the rolling chairs and to assist in other local transportation matters. Obviously the gentlemen engaged in this work have their hands full. They are always glad to be of assistance and can be depended upon to give the most courteous consideration to the needs of the conventionites. The members of the committee are as follows:

George C. Hannaway, Chairman, T. J. Moss Tie Company, Chicago.
 George R. Boyce, Vice-Chairman, A. M. Castle & Co., Chicago.
 C. C. Bailey, General Electric Company, Schenectady, N. Y.
 W. F. Bauer, Edison Storage Battery Company, Chicago.
 Charles A. Beaumont, Wilson-Imperial Company, Newark, N. J.
 Cliff Beaumont, MacLean-Fogg Lock Nut Company, Baltimore, Md.
 Arthur E. Biddle, W. H. Miner, Inc., Chicago.
 J. D. Brandon, Pittsburgh Steel Products Company, Chicago.
 Ralph Brown, The Curtain Supply Company, Chicago.
 R. B. Buram, Edna Brass Manufacturing Company, Cincinnati, O.
 Charles L. Butler, Detroit Lubricator Company, Chicago.
 Byard L. Clegg, Westinghouse Electric & Manufacturing Company, New York.
 Carl S. Clingman, Johns-Manville, Inc., St. Louis, Mo.
 A. W. Clokey, American Arch Company, Inc., Chicago.
 George E. Coffey, Union Railway Equipment Company, Chicago.
 F. J. Cooledge, Buckeye Steel Castings Company, Chicago.
 James L. Crowley, Templeton, Kenly & Co., Ltd., Chicago.
 E. C. Daniels, West Disinfecting Company, Chicago.
 S. C. Dinamore, The National Refining Company, Chicago.
 C. A. Dunn, Prime Manufacturing Company, Milwaukee, Wis.
 R. S. Folk, Bethlehem Steel Company, Inc., New York.
 C. H. Gaskill, Baldwin Locomotive Works, Chicago.
 Edwin L. Georger, Pratt & Lambert, Inc., Chicago.
 E. F. Gladwell, Buffalo Brake Beam Company, Lackawanna, N. Y.
 K. M. Hamilton, The Bettendorf Company, Chicago.
 R. M. Hamilton, T. J. Moss Tie Company, St. Louis, Mo.
 F. C. Hasse, The Oxweld Railroad Service Company, Chicago.
 Harold H. Hendricks, Youngstown Steel Door Company, Chicago.
 W. D. Hickey, Magnus Company, Inc., Chicago.
 George W. Hoover, The Buda Company, St. Louis, Mo.
 W. A. Houston, Joseph Dixon Crucible Company, Baltimore, Md.
 John C. Keene, The Bradford Corporation, Chicago.
 W. H. Kinney, Dearborn Chemical Company, New York.
 R. R. Lally, Globe Steel Tubes Company, New York.
 George J. Lawrence, J. B. Ford Company, Wyandotte, Mich.
 George J. Martin, Union Asbestos & Rubber Company, Chicago.
 J. C. Maxon, Graybar Electric Company, Philadelphia, Pa.
 K. A. Milar, Milar Clinch & Company, Chicago.
 J. A. McFarland, The Bird-Archer Company, St. Louis, Mo.
 William S. Noble, The Ruberoid Company, New York.
 R. R. Porterfield, The Superheater Company, Chicago.
 L. M. Ritchie, National Carbon Company, Inc., Cleveland, O.
 Robert N. Sinkler, Pilot Packing Company, Chicago.
 J. Soule Smith, Manning, Maxwell & Moore, Inc., St. Louis, Mo.
 J. T. Tarpey, Pittsburgh Spring & Steel Company, Chicago.
 Louis F. Theuror, Pittsburgh Plate Glass Company, Chicago.
 J. D. Underhill, The Okonite Company, New York.
 C. P. Whitehead, Commonwealth Steel Company, Granite City, Ill.
 Van Swearingen, H. M., Chicago Railway Equipment Company, Chicago.
 J. E. Wright, American Steel Foundries, St. Louis, Mo.

Other Committees

In addition to the above-mentioned committees there are several others, which, however, are in all cases made up entirely from the membership of the Executive Committee, as follows:

BADGE COMMITTEE.—This committee has had to conduct quite a guessing contest in order to be sure to provide a sufficient supply of badges. In spite of its optimism it usually runs short for one or more classes of badges. Special precautions have been taken this year to guard against anything of this sort. The chairman is L. B. Sherman and with him is associated H. E. Daniels.

BY-LAWS COMMITTEE.—This committee keeps a close watch on the rules and by-laws of the association, in order that they may keep pace with the rapid development of the work of the association. The chairman is H. E. Daniels; Charles C. Castle is associated with him.

HOTEL COMMITTEE.—The growth of the attendance at the meetings has taxed the capacity of the hotels at Atlantic City to the very limit. The task of this committee is to survey the hotel situation and to make sure that adequate facilities are available. It can be depended upon to protect the members if they have any misunderstandings or complaints. The committee consists of Charles H. Gayetty, chairman, and W. K. Krepps.

FINANCE COMMITTEE.—This committee has supervision over matters relating to finance and consists of one member, S. G. Down.

Conventionalities

H. H. Norris, of the Boston Elevated, and Mrs. Norris are convention visitors. The Boston Elevated now has about 200 motor buses in operation and is steadily increasing the number, and Mr. Norris is much interested in the bus exhibit.

A special message from the Seaview Country Club to the *Daily* received yesterday intimated that the golfers should enjoy their favorite pastime as soon as possible in view of the fact that our old friends, the Jersey mosquitoes, had not yet arrived in any noticeable numbers, but might visit the links almost any time.

Friends of F. D. Reed, vice-president in charge of purchases and stores of the Chicago, Rock Island & Pacific, are expressing their disappointment over the information that he will not attend the convention this year. Mr. Reed has been one of the stalwarts of the convention sessions for many years and was its chairman in 1923. This is believed to be Mr. Reed's first miss at the annual meetings of the association.

C. W. Crawford, chairman of the General Committee, Transportation Division, American Railway Association, is here to attend a conference of transportation and mechanical officers at the Ritz-Carlton today. The committee representing the Transportation Division will consist of Mr. Crawford, J. J. Bernet, president of the Nickel Plate; C. M. Sheaffer, chief of transportation of the Pennsylvania; W. S. Andrews, assistant to president of the Southern Railway, and B. R. Pollock, vice-president and general manager of the Boston & Maine. Their conference will be with the Arbitration Committee of the Mechanical Division and will relate to what it costs to transfer freight from cars having defects that cannot be repaired under load and how to minimize this cost.

J. G. Stuart, general storekeeper, Chicago, Burlington & Quincy, and four other supply officers of this road; Percy Hunter, assistant purchasing agent, C. J. Mackie, division storekeeper, A. O. Schultz, chief tie and timber inspector, and J. H. Waterman, reached Atlantic City yesterday with the interesting announcement that the roof is now being applied to the addition which is being made to this company's large reclamation plant at Eola, Ill. Upon the completion of this improvement, which doubles the building capacity, it is the plan, according to Mr. Stuart, not only to enlarge somewhat upon operations already being carried on there, but also to undertake the repair of all track tools for the system and to inaugurate the welding of maganese frog and switch work.

The multitude of friends of J. H. Waterman, superintendent of tie and timber preservation, Chicago, Burlington & Quincy, and the "grand old man" of the Purchasing and Stores Association, of which he is a past president, were glad to see him arrive at Atlantic City yesterday, but regretful to find him compelled to use crutches. Mr. Waterman fractured his knee in a fall from a pile of lumber as recently as Thursday of last week. He was advised against making the trip, but this was before 77 years of determination and a new doctor were thrown into the balance. The result, happily, is that with the aid of a plaster of paris cast and a pair of crutches, Mr. Waterman, who is accompanied by Mrs. Waterman, is on hand to make his scheduled address to the meeting.

Major George L. Spengler, of Peking, China, accompanied by Mrs. Spangler, is attending the conventions.

Mrs. Spengler was better known to the convention visitors two years ago as Miss Louise Bentley, and is a daughter of H. T. Bentley, general superintendent of motive power of the Chicago & North Western. Major Spengler was with the American Expeditionary Forces in Siberia during the war and it is indirectly the result of this that he now represents some American equipment and supply companies in the Orient, including the Superheater Company and the Standard Stoker Company. Major and Mrs. Spengler were married in Tokio, Japan, last fall. They arrived in the United States about ten days ago.

J. E. McQuillen, mechanical superintendent of the Gulf, Colorado & Santa Fe, at Galveston, arrived yesterday enthusiastic about both the good physical condition of his railway and its traffic prospects. He says that crop conditions in the Southwest never were more promising than now and that general business conditions are quite satisfactory.

Being an exhibit model motor bus is no job for a machine of a sedentary nature, as the six-cylinder stripped chassis Mack bus can testify. This bus, which is now enjoying a breathing spell in the motor transport tent, was exhibited at the Canadian Electric Railway Association at Quebec no longer ago than last week. Incidentally, C. J. Lyford, who helped chauffeur it to Atlantic City, is the son of W. H. Lyford, vice-president and general manager of the Chicago & Eastern Illinois, an enthusiastic and long-time advocate of the possibilities of motor transportation.

Roy C. Beaver, assistant mechanical engineer, Bessemer & Lake Erie, Greenville, Pa., who arrived yesterday, reports that the Bessemer is expecting to do a large ore hauling business now that navigation has opened up on the lakes. The steel mills will not only need more ore for current requirements but they will also require additional ore to replenish their reserve stock, which was permitted to run down during the past year. Mr. Beaver is the author of a number of technical articles, one of which, "Derailments of Locomotives on Curves," was published in the December, 1924, and January, 1925, issues of *Railway Mechanical Engineer*. This article, which is the result of an investigation conducted on the Bessemer, has received considerable favorable comment and has also been reprinted in bulletins published by the railway departments of the Governments of Great Britain and India.

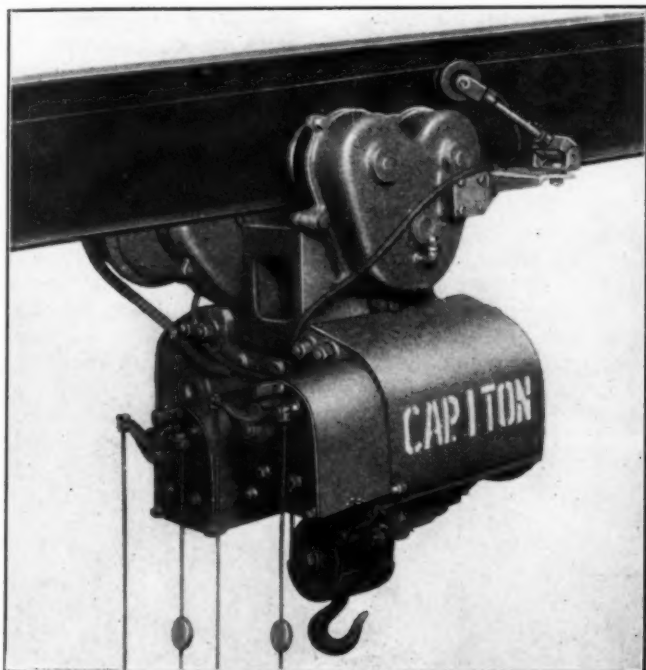
A. S. McKelligon, general storekeeper of the Coast Lines of the Southern Pacific, and a member of the general committee of Division VI, though coming all the way from San Francisco, is accorded the distinction of being the second arrival for the stores convention to be seen in Atlantic City. Mr. McKelligon having been found on the boardwalk on Monday, only a short time after the appearance of H. H. Laughton, assistant to the vice-president, operation, Southern, who is also a member of the General Committee. Mr. McKelligon's arrival is a reminder of the recognition paid to railway supply officers this year as evidenced by the fact that Mr. McKelligon is president of the Pacific Railway Club, sharing honors with W. F. Jones, general storekeeper of the Lines East, New York Central, who is president of the New York Railroad Club, and as evidenced also by the presentation of papers on supply problems before these and other clubs during the year, among which was the paper of U. K. Hall (Union Pacific) before the Pacific Railway Club, the addresses of F. D. Reed (Rock Island) and J. G. Stuart, (C. B. & Q.) before the Western Railway Club, that of C. D. Young before the New York Railroad Club and also that of J. G. Stuart before the Maintenance of Way Club of Chicago.

New Devices

Motor Trolley for Small Lo-Hed Hoists

A MOTOR-DRIVEN trolley which is being exhibited by the American Engineering Company, Philadelphia, Pa., is for use with its half-ton and one-ton Class A Lo-Hed electric hoists which have been built heretofore in bolt-suspension and plain-trolley types only.

The trolley can be supplied with a travel speed of 80 or 120 ft. a minute, so that the trolley and hoist provide



Class A Lo-Hed Electric Hoist with Motor-Driven Trolley

an inexpensive overhead system for handling loads of one ton or less at high speed, both in lifting and moving. Its accurate control makes it efficient in spotting work for machine-tool operations. It can be arranged for remote control, if desired.

Any Class A Lo-Hed hoist now in service can be easily converted into a motor-trolley hoist by adding the new trolley.

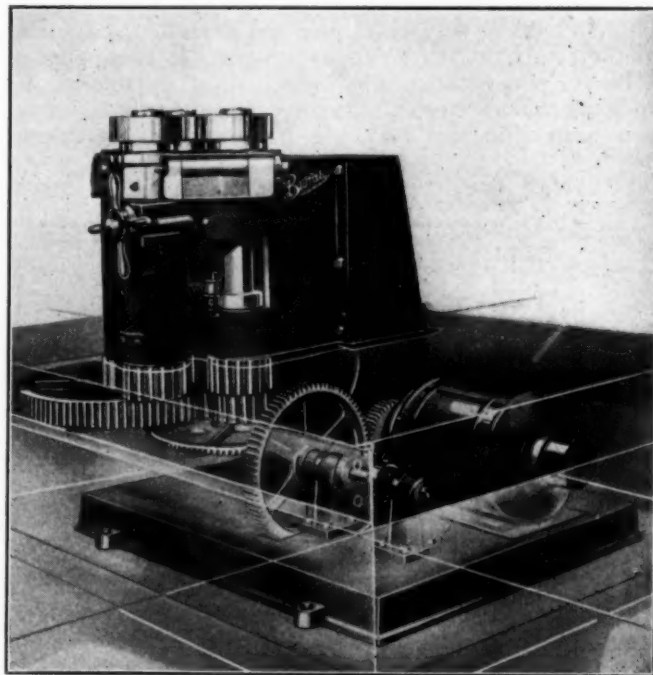
Only 22 in. of headroom is required for the hoist and trolley, which is small for a motor-trolley hoist. The trolley is ruggedly built and maximum traction is obtained by driving all four wheels. The three main castings, from which the hoist and load are suspended, are of steel. The spur gear drive is totally enclosed and runs in an oil bath. Hyatt roller bearings are used on all shafts. The motor also is totally enclosed and has ball bearings. All parts are completely accessible and the motor can be removed readily when necessary.

The motor can be furnished for direct or alternating current, either two or three phase.

Machine for Bending Metal Shapes

THE Buffalo Forge Company, Buffalo, N. Y., has included in its exhibit a machine for bending curved rolled shapes. These machines are made in three sizes and are designed to bend into arcs or circles, angles (leg in or out), squares, rounds, flats on edge or flat, copper tubes No. 12 or No. 16 gage, standard steel pipe, heavy and extra heavy steel pipe, channels and I-beams (on web or flange.) With the smallest machine, circles as small as 14 in. diameter are easily made and from this small size up to any desired diameter and adjustment of the rolls of only $1\frac{3}{4}$ in. is sufficient.

The entire machine is mounted on a cast iron base plate which is set in a shallow pit. Channel irons placed on the floor support a heavy checkered steel plate which surrounds the machine. This checkered plate is the height of the channel irons above floor level, making a convenient working platform. The rolls are at a suitable height



A Machine Designed Especially for the Bending of Curved Rolled Shapes

to handle the work conveniently on a horizontal plane. All gearing is concealed and out of the way. The machine is driven by a reversing type electric motor which, through a pinion and gear, drives the main drive shaft of the machine. The reversing motor eliminates pulleys and does away with slipping of the clutch. Lubrication of the motor and main shaft bearing is taken care of by ring oiling bearings which require only infrequent attention. All other parts of the machine are fitted with Alemite connections. The hollow upright column at the back of the machine has shelves for storing additional rolls.

Nitro-Valspar System for Painting Railway Equipment

VALENTINE & COMPANY, 456 Fourth avenue, New York, has recently introduced the Nitro-Valspar all-lacquer system for painting passenger cars and locomotive tenders. It consists of three principal materials: namely, primer, gunglaze and enamel. Each one is a nitrocellulose product engineered to perform correctly its special function of combining with the other materials to make a perfect whole of the complete finish.

Together with durability, this system provides for speed of application, as all materials, from primer to finishing coats, air-dry at normal shop temperature in about one hour per coat. The Nitro-Valspar system not only produces a durable finish, but is also claimed to be resistant to the destructive action of rain, mud, cinders, car-cleaning compounds, dust, oil, gasoline, ice, snow and steam.

The primer forms the foundation of the Nitro-Valspar system. It has the adhesive qualities of the highest type of varnish or oil type primers. It is colored so as to guide the painter in applying an even coat over the entire surface, but under no circumstances should the primer be applied so heavy as to cover the surface with solid color. It is furnished ready for application and, after careful stirring, should be applied with a spray gun in a thin coat. The primer dries at a normal room temperature in 10 to 20 minutes, ready for the next coat of the system and is suitable for use on metal of all kinds.

The gunglaze may be termed the keystone of the arch of the complete Nitro-Valspar system. It is supplied as a heavy, non-settling liquid which must be thinned for spraying with Nitro-Valspar solvent in the proportions of two parts gunglaze and one part solvent by volume.

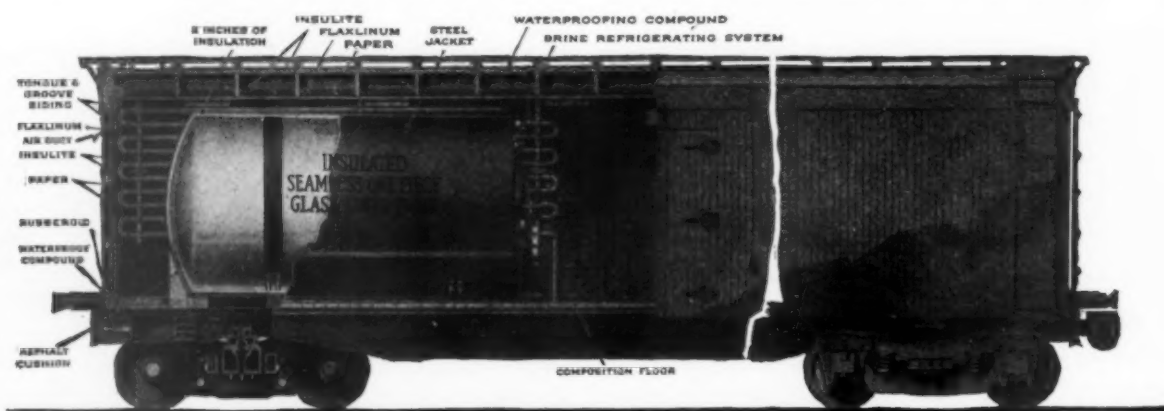
thorough stirring, with approximately equal parts of Nitro-Valspar solvent by volume to the proper spraying consistency. Two or three coats are usually sufficient and, on account of the exceptionally rapid drying properties, all the necessary enamel coats may be applied in one hour.

Glass-Lined Refrigerated Milk Car

TO meet the growing demand for a milk car which would enable milk dealers to reach out a greater distance from the large cities for their bulk milk supply, the General American Car Company, Chicago, has developed and patented the refrigerated glass-lined milk car. The car is a specially insulated type for express service containing two glass-lined tanks of 3,000 gallons each, or a total capacity of 6,000 gallons. These tanks are equipped with motor-driven agitators for insuring a perfect mixture of the contents. The interior of the car and tanks are electrically lighted and 20-in. manholes are provided for entering the tanks for cleaning and inspection.

The tanks are mounted in a steel cradle which is riveted directly to the underframe of the cars. These tanks rest on a cushion of specially prepared asphalt to prevent injury to the tanks. This cushion material has been developed to avoid crystallization in cold weather and softening when the tanks are sterilized.

Brine coils are provided to pre-cool the car at the time of loading, or in case the car is used for storage purposes. The cars are also equipped with blowers for unloading where gravity unloading is not practical, the air used being



A Phantom View Showing the Construction of the Insulated Milk Tank Car

Owing to its high pigment content, one to three coats are sufficient, depending upon the smoothness of the surface. Regardless of the number of coats, gunglazing is a continuous operation, each coat immediately following the preceding one.

After drying for a few hours at normal room temperature, the gunglaze is ready for rubbing. It dries naturally to a smooth surface so that, frequently, on railway equipment, a light, dry, scuff sanding may be substituted for the usual water-sanding operation. However, wet-sanding is often necessary.

The enamel amalgamates with the Nitro-Valspar undercoats, forming one integral film from metal to final finish. It is a highly developed pyroxylin enamel and is applied by the usual spray methods. The enamels are supplied in heavy liquid form and must be thinned, after

passed through a specially designed air filter. The tanks are further provided with a 4-in. sanitary inlet and outlet. Test cocks and thermometers are placed on the head of the tank.

The car is constructed with a removable type of roof to provide for the removal and replacement of the tanks without disturbing the insulation in the walls of the car. The floors are of 3/16-in. steel plates, flanged 10 in. up on the sides and ends, with all the joints welded to prevent moisture from reaching the insulation.

The cars are provided with high-speed trucks and through electric wiring for express passenger train service.

This equipment is built for sale or lease under patents held and controlled by the General American Car Company.

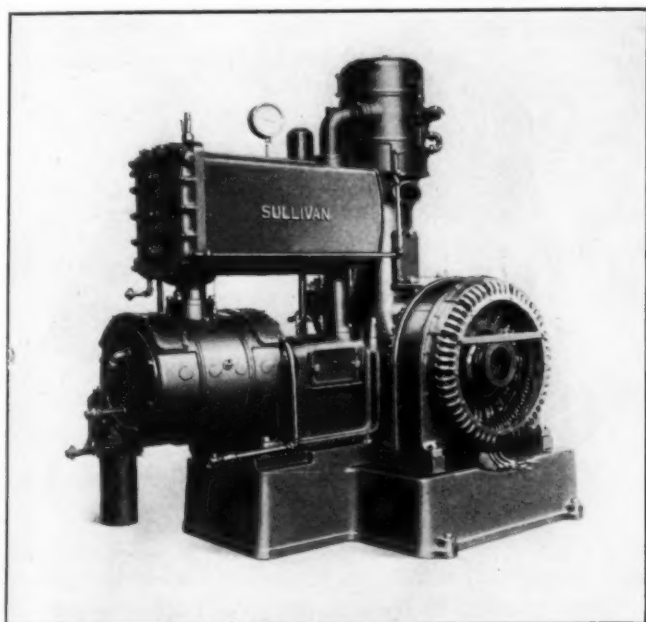
Angle Compound Motor-Driven Air Compressor

THE accompanying illustration shows an angle compound air compressor, direct connected to an electric motor, which is included in the exhibit of the Sullivan Machinery Company, 122 South Michigan avenue, Chicago, Ill. This machine has its low-pressure cylinder in a horizontal plane, while the discharge or high-pressure cylinder and its frame are mounted on the front end of the horizontal frame, forming a right angle machine.

Freedom from vibration is assured by the exact balancing of the horizontal and vertical parts and forces. Distorting strains are largely absent in this type of compressor. For example, the horizontal and vertical connection rods are attached to the same crank pin, side by side, so that there is almost complete elimination of twisting strains on the crank shaft.

The Sullivan wafer automatic air valves are used for both inlet and discharge, which is designed to give high volumetric efficiency with low lift and freedom from wear and breakage.

The intercooler used consists of three separate nests of copper tubes—two sets in the smallest machine—across



Sullivan Angle Compound Motor-Driven Air Compressor

which the air is forced by baffle plates to take a circuitous course, coming in contact with the cold water tubes several times in each nest. This reduces the temperature of the air after the first compression in the low pressure cylinder. It also affords an opportunity for water, which is condensed from the air in its passage through the intercooler, to be collected in a pocket at one end of the shell, where it is drained off readily. This prevents danger to the discharge valves which may occur when the water is carried over into the high pressure cylinder.

Another interesting economy factor in the operation of the compressor is the load control. As it is rare that an air compressor works continuously at full load, the question of the relative power consumption at varying partial loads is an important one. These compressors employ a universal automatic control. The most economical points of operation of any machine are at full load, or at no load,

when it is doing no work except overcoming the friction of the moving parts, which is always present at any load point.

The Sullivan load and capacity control, therefore, operates to shut off the incoming air to the compressor completely when the demand for air ceases and when the demand for air is renewed, that is, when the pressure in the receiver falls below the point at which the unloading device is set to act, this valve again opens fully and the compressor automatically resumes its entire load, completing the cycle. The action of this control device is gradual and smooth and the load is picked up evenly without sudden shocks and consequent fluctuations or high points in the power consumption curve.

Supplementing the action of this device, a high pressure release valve is placed on the discharge cylinder. When the low pressure unloader has been on for a few revolutions, and the high pressure cylinder has pumped out the intercooler, this automatic release valve opens, discharging to the atmosphere any air which may have leaked into the machine. All chance of building up excessive heat and pressure in a closed circuit is thus eliminated, preventing unnecessary work being done and assuring that the minimum amount of power is consumed. With this type of control the peak load demands are no greater than the greatest fractional load.

The drive consists of a General Electric, Type T.S., 100-hp. synchronous motor, mounted directly on the crank shaft close to the compressor frame. Outside excitation is provided, permitting a compact and neat looking compressor unit. In this particular unit, a cast iron sub-base is supplied, on which the compressor and motor parts are mounted, making a self-contained outfit. The sub-base is heavy enough to absorb all vibration, so that no additional foundation is needed. The hollow base may be filled with concrete if desired.

Twin units may be furnished, consisting of two complete, angle compound machines driven by a coupling from a centrally located electric motor, mounted on its own pedestal frame, and having its own individual bearings and lubrication.

Yale Elevating Platform Truck

THE Yale & Towne Manufacturing Company, Stamford, Conn., is exhibiting this year a new elevating platform truck, the Yale K23E, which is designed primarily to carry unusually heavy loads. Although this machine is not of the high lift type, it embodies desirable



The Parts of the Yale K Series of Trucks are Interchangeable with other Types of this Manufacturer

self-loading features. The short turning radius and the narrow width of this machine make it easy to drive in and out of box cars or narrow aisles. Hardened steel steer-

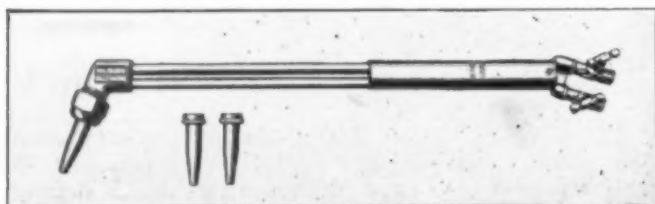
ing pivots with bronze bushings and a high pressure lubricating system reduce friction and make steering easy even when carrying a full load. Heavy pressed steel frame members and large elevating links which support the platform admit of carrying the load with an ample factor of safety.

The elevating mechanism is of the triple spur gear type and parts are interchangeable with those of other type trucks made by this company. The elevating platform is raised by means of two large eccentrics mounted on the hoist unit shaft which draw the platform forward and upward on the platform links. Mechanical upper and lower limit stops assure simple and safe operation of the lift mechanism. A special feature of the Yale K series trucks is the spur-gear unit power axle—a sub-assembly interchangeable with that used in all models. The standard Yale system of control is used.

The majority of parts, units and special assemblies of this elevating platform truck are standard. When two or more different Yale K series trucks are used in one plant this interchangeability offers definite operating advantages and economies.

Milburn Small Welding Torch Uses Standard Tips

CONSISTENT with the demand for a small welding torch for work not requiring the usual standard torch. The Alexander Milburn Company, Baltimore, Md., has brought out the Type J-Jr. torch, which is included in this company's exhibit. This is a sturdy, compact torch giving a high degree of efficiency and economy. The torch uses the same tips as are supplied with the standard larger torches and is adaptable to all classes of welding. It uses low and comparatively equal pressures of oxygen and acetylene.



The J Jr. Torch is a Compact Model Which Uses the same Tips Supplied Larger Torches

Because of its light weight, it is easy to operate continuously. Its use is said to show savings in gas and a speeding up of the work.

The supermixing of the gases through a standardized system of multiple mixing assures a uniform flame. The seats of the tips are flat, with annular grooves coinciding with those in the head, the gas passages entering through the annular grooves or rings which separate the gases. The construction of these seating surfaces allows lateral expansion of torch head and tip without distortion and the seats are very easily refaced.

The J-Jr. torch is adapted to gas supplied either from generators or compressed in tanks. The torch is made of bronze forgings and specially drawn stainless tubing. It is simple in construction, with all parts easily accessible.

An angle of $67\frac{1}{2}$ deg. in the head allows a natural

position in operating the torch, utilizes the heat to best advantage and protects the operator's hands. Equally balanced, the torch is easily manipulated and will not tire the operator.

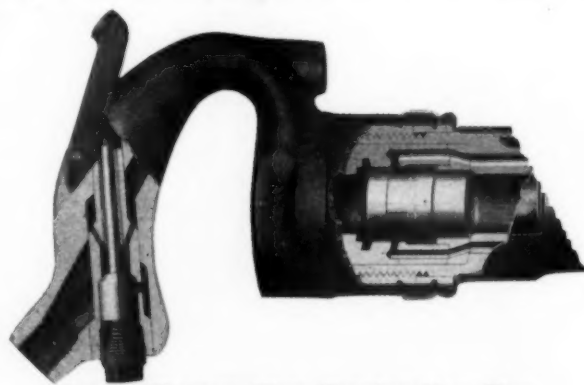
The J-Jr. is 18 in. long, weighs 25 ounces and is furnished with three welding tips adaptable to a wide range of welding.

Thor Riveter Improved

THE illustration shows important improvements recently incorporated in the construction of Thor pneumatic riveters, made by the Independent Pneumatic Tool Company, Chicago. The handle is not subject to bending cracks, being drop forged to final shape with a heavy section at the bend. All portholes are drilled full and clear and spiral inlet ports to the throttle valve in the handle allow easy regulation of speed and blow. The large nipple lug at the end of the handle eliminates danger of breakage at this point with reasonable handling.

The poppet throttle valve, of the balanced, self-seating type, is designed to be always air-tight and give perfect regulation. The cylindrical shape of the valve body affords accurate balance.

A positive ratchet lock is provided between the barrel and handle, the octagonal milling on the sliding collar giving a large bearing surface to hold the collar rigid.



Partial Phantom View Showing New Thor Riveter Construction

There are no small pins to lose or wear or work out. The odd number of ratchet teeth combined with the even number of sides in the octagon give eight positions for perfect mesh on each ratchet tooth. The collar is simply turned from one octagonal face to another until perfect mesh is obtained.

The main valve is a hollow, substantial sleeve of heavy section with no portholes to plug up or start cracks and has a large bearing surface for lubrication. The lower end of the valve bore is ground taper larger than the bore in the barrels, preventing the piston from striking the valve. The inlet and exhaust ports are widely separated by three different valve diameters to prevent leakage and loss of power.

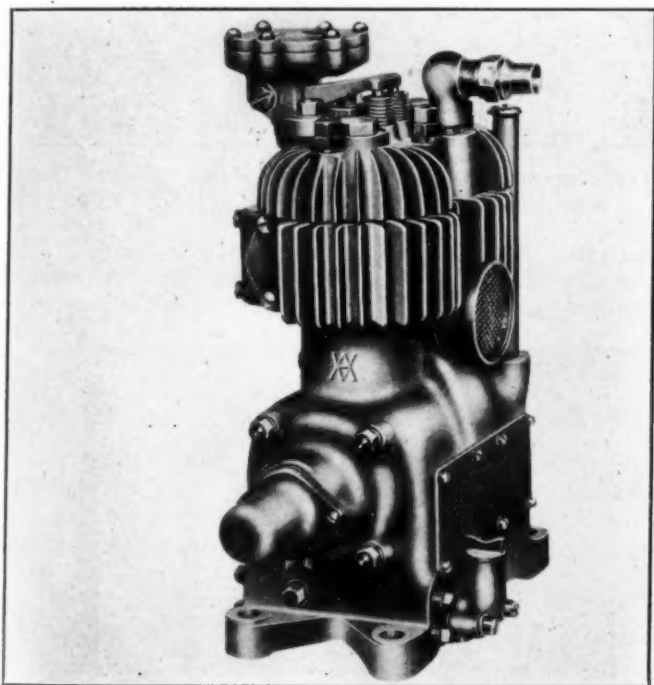
The barrel is made of selected alloy steel, carefully heat treated, with the piston bore hardened, ground and lapped to size in order to remove all grinding marks, which will wear down rapidly. The barrel bore is thus given a smooth, compact surface, having an accurate, air-tight bearing with the piston, which assures long life and maximum hammer efficiency.

New High Speed Air Compressor

ONE of the late developments of the Westinghouse Air Brake Company, Wilmerding, Pa., which is being exhibited during this year's conventions, is the high speed light weight Type B air compressor which is used primarily in gas rail-car service.

The compressor is of the type which has rendered satisfactory service in the automotive field for several years. Weighing but 72 lb. with dimensions of approximately 16 in. by 16 in. by 8 in., it has the two features of light weight and compactness to recommend it for gas rail-car application. This compressor is a high speed single acting machine with two vertical cylinders cast en bloc, driven by a power take-off from the rail-car engine. The drive may be from either end. The displacement is 12 cu. ft. of air per minute at 1,200 r.p.m. On a moving vehicle the compressor is suitable for continuous operation at a maximum pressure of 75 lb. The bearing lubrication is of the force-feed type by means of an oil pump gear driven from the compressor crank shaft.

Compressor control is effected by a pressure regulator, operating in conjunction with the unloading head of the compressor. The regulator weighs but 14 lb. and is



Westinghouse Type B High-Speed Air Compressor, Designed for Gasoline Rail-Car Service

provided with feet to facilitate installation at a convenient point inside the car where it is accessible for adjustment. At its cutting-out point the regulator functions to admit pressure to the compressor unloading head wherein a diaphragm is deflected to unseat two unloading valves, each of which is located in a passage from a compressor cylinder. This action converts the two passages to one port common to both cylinders, so that no further compression occurs past the discharge valves. The pistons therefore float under the passage of air from one cylinder to the other through the common passage. While the compressor turns over in this condition the power consumption is slight, it being only that necessary to over-

come friction of moving parts. At the cutting-in point the unloading valves are seated, destroying the common passage to both cylinders so that compression is resumed past the discharge valves.

Duff Governor Speed-Controlled Jacks

THE Duff governor controlled self-lowering jack which is a part of the exhibit of the Duff Manufacturing Company, Pittsburgh, Pa., embodies the principle of governor control of lowering speed. This is a Duff patent to insure safety under all conditions. It is important when two or more jacks are used together under locomotives, cars or other loads, that the jacks be designed to lower the load with uniform speed. The governor minimizes the possibility of one jack lowering



Jack with Governor for Controlling the Lowering Speed

more rapidly than the others, thereby eliminating tipping or an uneven lowering of the load. These jacks may be slowed down gradually or stopped instantly at any point without shock on the mechanism. An over-size key is provided to prevent turning of the standard and to keep the jack from screwing out from under the load. To prevent over-extending, a positive stop is provided at the base of the standard.

The jack is simple to operate. There is but one pawl on the lever socket and this has three positions. In the first position it raises the load in the usual manner. The second is neutral and a third is used for running the standard down without the load. A piston lock is provided to hold the load, which also serves as a brake when gradually lowering the jack under load.

All the working parts and bearings are mounted as an integral unit in a one-piece shell which assures the alignment of the parts. The rated capacities of these jacks are 15, 25, 35 and 50 tons.

Extension Shoe for Simplex Car Jack

A **SIMPLEX** car jack which is exhibited by Templeton, Kenly & Company, Ltd., 1020 South Central avenue, Chicago, is shown in the illustration; it is equipped with a cap which provides for the ready attachment of an auxiliary shoe. This cap which is now being furnished on all Simplex car jacks of 15 tons



Simplex 15-ton Capacity Car Jack Equipped with an Extension Shoe

capacity provides a greater range of lifts and eliminates the necessity of using blocking under the jack. The cap and auxiliary is made from drop forged steel which provides a maximum strength with a minimum amount of weight. It is designed for use on jobs where it is impracticable to lift loads with either the cap or the shoe of the rack bar.

Venturi Suction Torch Equipment

VENTURI suction torch equipment made in five different sizes, ranging from a large burner with a 20-gal. tank down to a small burner with a 5-gal. tank, is included in the exhibit of the Hauck Manufacturing Company, 134 Tenth street, Brooklyn, N. Y. The torches comply with safety and insurance requirements because no air pressure is maintained on the oil supply tank, thereby eliminating the danger of injury to life and the danger of fire resulting from a bursting tank. The danger of oil spreading about by the breaking of the oil supply line is also eliminated. The torch works satisfactorily in all positions, up to a height of ap-

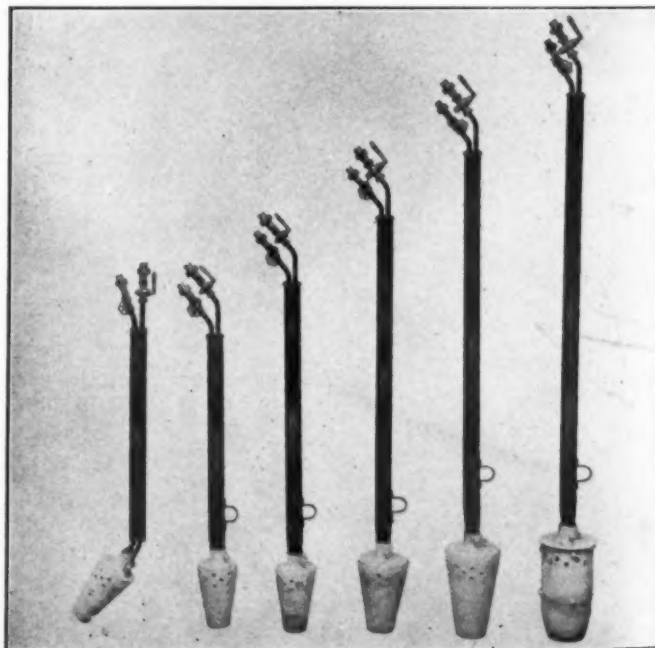
proximately 14 ft. above the top of the tank. It can be swung vigorously about without the torch going out. The torch is easily lighted with a small piece of oil-soaked waste.

Pressure torch equipment already in operation can be



The Complete Equipment of the Hauck Suction Torch and Fuel Tank

converted into suction or vacuum types without the necessity of purchasing complete equipment. All that is required is a torch or burner, a length of oil hose and the

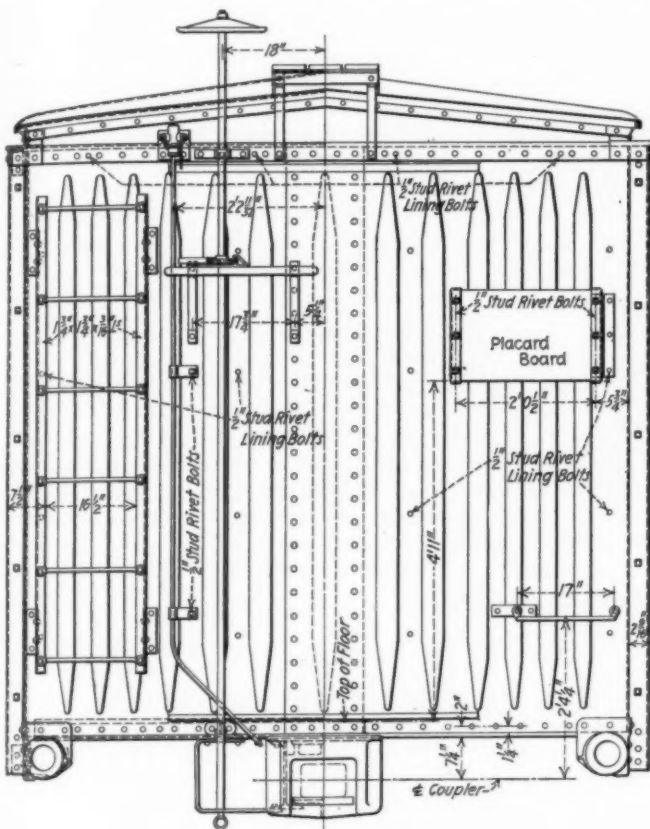


The Different Sizes of Venturi Suction Torches

oil tank connection. The compressed air connection of the burner is connected directly to the shop air supply by means of a hose.

THE Atlas corrugated all-steel end for box cars, which is being exhibited by the Chicago-Cleveland Car Roofing Company, 1617 Kimball building, Chicago, is made in two pieces. The two edges are riveted together at the center line of the car. The fea-

THE Atlas corrugated all-steel end for box cars, which is being exhibited by the Chicago-Cleveland Car Roofing Company, 1617 Kimball building, Chicago, is made in two pieces. The two edges are riveted together at the center line of the car. The fea-



The Corrugations near the Center of the Atlas Car End are Three Inches Deep

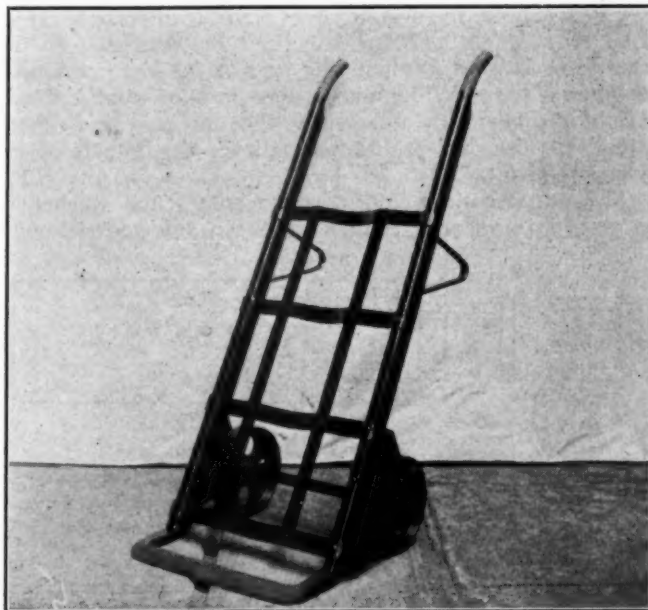
ture of this car end is that while the outside corrugations are of a standard 2-in. depth, the center corrugations have been increased to 3 in. in depth, giving the benefit of the greater beam strength of the heavier corrugations in the center of the car end where the stress on the ordinary end is the greatest.

Anchor All-Steel Trucks

THE truck shown in the illustration is designed for heavy service in warehouses and freight terminals. The angle cross straps, reinforced by two vertical straps, afford maximum resistance to bending pressure. The depression in the cross straps permits the handling of loads of all sizes and shapes. The handles are smooth and well insulated and are properly curved to facilitate the handling of loads. Each member is securely joined by extra size machine bolts and lock-nuts; replacements, if necessary, can be made within a short time and at a minimum expense. The nose pieces are of a special alloy steel. These trucks can be equipped with solid rubber tread wheels and also with roller bearings.

The following is a few of the principal specifications:

Length of side bar 60 in.; width of handles, center to center, 21½ in.; width of nose 23 in.; length of nose



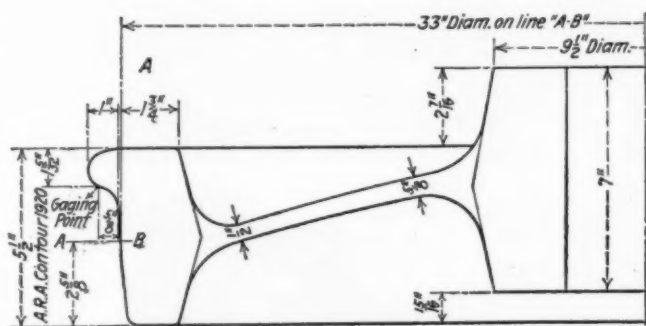
Type 604—A.s. All Metal Truck for Use Around Freight Terminals and Warehouses

6 in.; wheels 10 in. by $2\frac{1}{2}$ in.; axles $1\frac{1}{8}$ in. sq.; approximate weight 117 lb.; angle of tippage 27 deg.

This truck is manufactured by the Anchor Post Iron Works, 9 East 38th street, New York.

Light Weight Steel Wheels for 57 1/2-Ton Capacity Cars

AMONG the exhibits of the Carnegie Steel Company, Pittsburgh, Pa., will be found two new designs of light weight wrought steel wheels for use under freight cars of 57½ tons' capacity or lighter. Being designed especially for the lighter cars, these types present an opportunity to effect possible economies by their use under the cars specified. These wheels, manufactured in



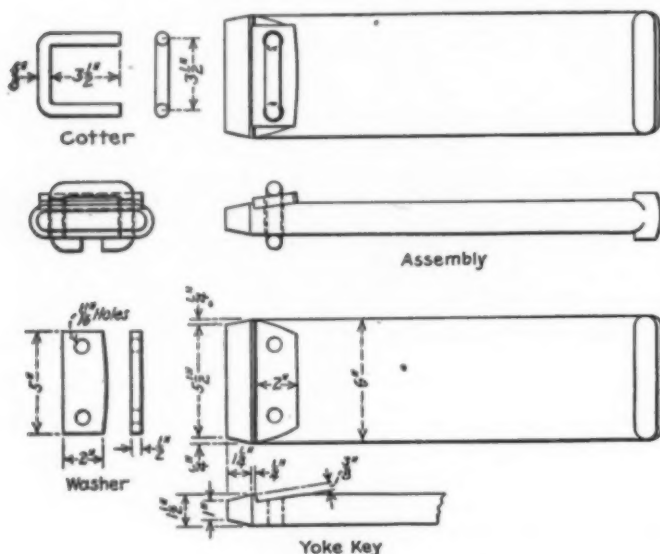
Section of New Carnegie Light Weight Steel Freight Car
Wheels

the same manner as the heavier wheels for freight and passenger cars and locomotive tenders, are said to possess the same degree of wheel safety and quality as the heavier wheels. The accompanying illustration shows the section and principal dimensions of the two types which, as noted, are similar except for dimension *A* which in one case is 1 1/4 in. and in the other is 1 3/4 in.

McKay Draft Key Retainer

THE illustration shows the McKay draft key which is simple in design and readily interchangeable. Any single part of this key or retainer can be used to replace a corresponding part of the key previously in general use. While the washer is somewhat refined, it interchanges with and serves the purpose of washers already in use and in addition relieves the U-bolt of all shearing strain.

The purpose of rounding the edge of the washer is to provide tangential contact with the sills even though



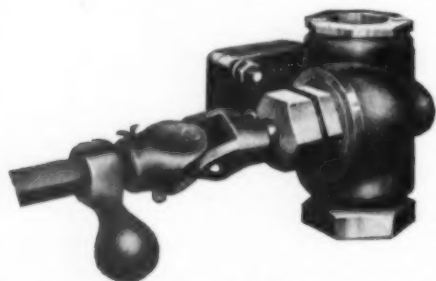
The McKay Draft Key Which Can Replace a Corresponding Part of a Key Previously in Use

the coupler may be at an angle. It is this angling of the coupler, under load, that has sheared so many U-bolts. The McKay key puts the shear on the key itself and in such a way that sufficient strength is provided to overcome the friction between the coupler and the draft key.

The McKay draft key is a part of the exhibit of the Standard Coupler Company, New York, which controls this device and has granted the Steel Car Forge Company, Pittsburgh, Pa., exclusive license to manufacture and market it.

Two-Inch End Train Pipe Valve

THE Vapor Car Heating Company, Railway Exchange building, Chicago, has included in its exhibit a 2-in. end train pipe valve which provides



An End Train Pipe Valve which Provides a Larger Area Through the Valve than the 2-in Steam Train Line

a larger area through the valve for steam passage than the area of the 2-in. steam train line. This facilitates a quicker

passage of steam to the rear of long trains, because it relieves the friction at the ends of cars where restricted end valves have been used.

The valve is made with an internal locking arrangement to lock the valve in the open position automatically. The operating arrangement is counterbalanced, making the method of operation simple, either from the platform or the side of the car. The valve is adapted for use with either the stationary or movable type of drawbar equipment and is designed to utilize the same operating arrangement furnished with the company's 1½-in. size.

The design of the valve is such that when in the closed position it makes a positive, non-leaking seat, and at the same time provision is made by means of an easily operated bleed port through the valve itself, for eliminating train line condensation through the rear steam coupler.

The valve is furnished with either flanged or pipe thread connection for the train pipe. It is made with a 90-deg. outlet and is furnished with a suitable bushing where it is desired to use a 2-in. end valve and maintain the present standard 1½-in. steam hose.

Niles 48-In. Car Wheel Borer

THE Niles-Bement-Pond Company, 111 Broadway, New York, is exhibiting a 48-in. car wheel borer in which same changes have been made in the crane, control, alinement of parts and the counterbalance for the boring bar.

The crane for handling the wheels on and off the table is located conveniently on the side of the machine and,



The Pneumatic Crane is Controlled from the Front of the Machine

therefore, does not require extra head room. It may be either of the pneumatic or motor-driven drum type. The pneumatic crane can be controlled from the front of the machine where the operator is near the wheel. The drum type crane is driven by a separate 5-hp. motor and

is controlled by friction clutches operated by a conveniently located lever.

The long reach of the crane arm enables it to swing over two wheel supports. The finished wheel may, therefore, be lowered at one point, while the next wheel to be bored is ready to be picked up from the other support.

The change from roughing to finishing feeds is by a single four-position lever within easy reach of the operator. The feeds are positive through sliding gears and tooth clutches entirely enclosed in a feed box.

The traversing of the bar has been made easy by the introduction of a compound gear reduction so that the large hand wheel can be spun around and the bar moved up with little effort.

An effective means for takeup wear in the boring bar has been provided by the addition of tapered bushings. Owing to the nature of this method of takeup, the alinement of the boring bar and table spindle, despite wear, will always be maintained.

The column is counterbored to receive a bushing which is fastened in place by screws. The bore of the bushing is tapered and into it a conical split bushing is fitted. Threaded into the bushing are five adjusting screws with slotted ends and lock nuts. Any appreciable wear can be readily taken up by loosening the lock nuts and turning up the screws with a screw driver. The split bushing collapses around the circumference of the boring bar, this one adjustment automatically taking up the wear in all directions. The alinement is preserved by the conical bearing between the two bushings which receives no wear.

The table is carried on a large tapered spindle fitted into a tapered bushing. A ring is threaded on the bottom of the spindle. Turning this ring forces the bushing up to take care of any wear. An adjustable collar prevents the table from lifting.

The counterweight for the boring bar runs on rollers on an inclined way at the back of the frame. The guides are designed so that, should the cable break, the counterweight cannot fall off the machine.

The 1/2-hp. motor shown at the left of the boring bar housing drives the feed mechanism through a large gear mounted on the feed friction. After the wheel is finished the bar is raised in an instant by pushing the button. A safety limit switch throws out the motor at the end of the bar travel.

Westinghouse Type N Friction Draft Gear

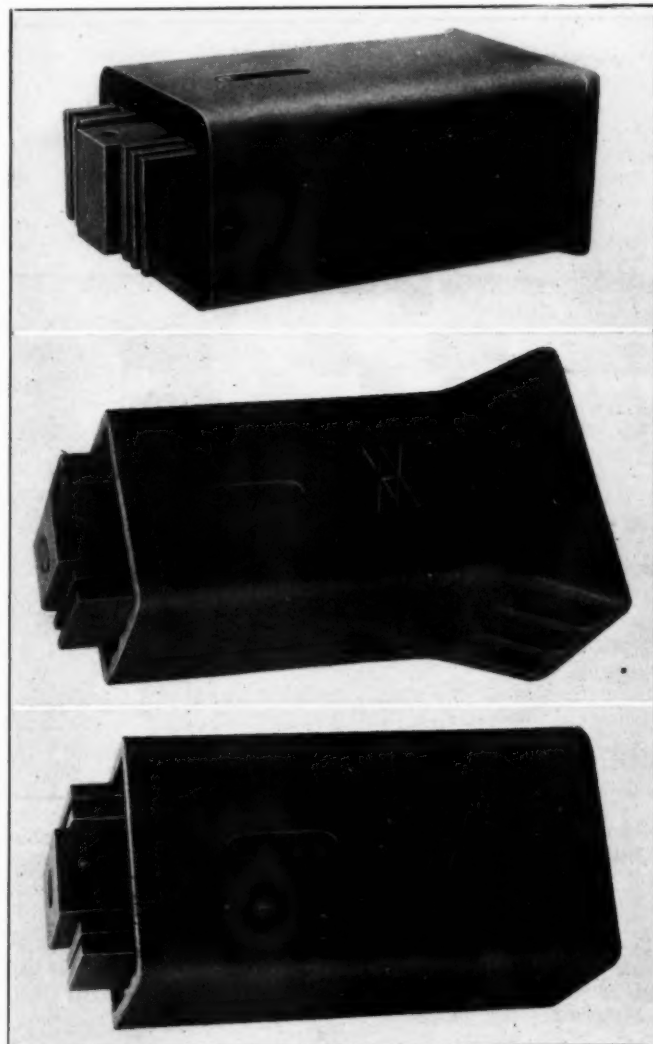
THE Westinghouse Friction Draft Gear Company, Pittsburgh, Pa., has recently developed two new friction draft gears, the NY-10 and NZ-10, which together with the N-11-A complete a full line of the N type gears.

The N-11-A gear has been in use for some time. It is a high capacity gear of 2 3/4-in. travel. Expressed in drop test measure, a free fall of 23 in. of a 9,000-lb. tup produces full closure. Its dimensions permit its installation with one 2 1/4-in. follower block in the standard 24 5/8-in. spacing. It is designed for heavy duty and is a unit of high absorbing capacity.

Designed along the same general lines of the N-11-A, the NY-10 gear differs in that it is of smaller capacity.

Its travel is 2 7/16 in., full closure being produced by a 16-in. free fall of a 9,000-lb. tup. It is 22 3/8 in. in length, which, with one 2 1/4-in. follower block, renders it applicable to the standard 24 5/8-in. spacing. Frictional details of the wedging system are identical with those of the N-11-A gear.

With the same wedging system as the N-11-A and NY-10 gears, the NZ-10 is 20 1/8 in. in length, thereby rendering it applicable to cars on which the pocket spacing is less than the standard 24 5/8 in., or for replacement of old gears of the same length and travel. Its capacity is measured by a 14-in. free drop of the 9,000-lb. tup for closure through its 2 7/16-in. travel.



The NY-10 (Center) and NZ-10 (Lower) Draft Gears, While Designed on the Same General Principles as the N-11-A Gear (Top), are of Relatively Smaller Capacity

All N type gears are of the self contained type, the working parts being assembled within an annealed cast steel housing and locked under initial compression in their proper relation by a key, thus forming a complete unit that is easily transported or installed. Wear of frictional elements can be taken up by a simple shim, thus maintaining the gear at original capacity. Moveable friction plates are of steel and stationary plates of malleable iron.

Sym-Asco Journal Box Lid

BY ARRANGEMENT with the Allegheny Steel Company, Pittsburgh, Pa., the Symington Company, New York, has included in its exhibit the Sym-Asco journal box lid, a form of articulated or self-adjusting lid that is held tightly closed against the top, bottom and sides of the box face by a center pressure spring action.

This arrangement permits use of the Symington malleable spring retainer, replacing pressed steel, which affords protection to the working parts and shields the top of the lid joint against an accumulation of dust or cinders and the entrance of water. It also provides a large bear-



Beginning at the Top May Be Seen the Headless Pin, Malleable Spring Retainer and the Lid Body with the Torsion Type Roller Bearing Spring in Place

ing area on the hinge pin which prevents the cutting of the pin. No tool or bar is needed to latch or unlatch the spring retainer to apply or remove and replace the lid, as foot pressure is sufficient.

The Sym-Asco lid is made of full $\frac{1}{8}$ -in. plate, heavily corrugated to give it stiffness, and with side and bottom flanges. It is carefully made to insure a snug fit against the journal box face. The torsion spring bears on the center of the lid and, when closed, forces the lid tightly and uniformly against all four sides of the box opening. When the lid is fully opened the spring positively retains the lid in open position without danger of closing.

With this spring all frictional drag is avoided by means of a roller bearing where the spring bears against the hinge lug. This insures spring pressure directly against the closed lid at the center. The spring retainer or housing completely encases the spring and furnishes the fulcrum against which the coiled section of the spring bears. It does not touch the lid.

The hinge pin is merely a piece of $\frac{3}{4}$ -in. round bar cut to length. It requires neither a head, slot, cotter or

washer as it is held in place by ears integral with the hinge scroll. A positive lock is given the pin by turning down the ears on the scrolls. There are no cotters to work loose and no other fastening necessary.

This lid is independent of the location and diameter of

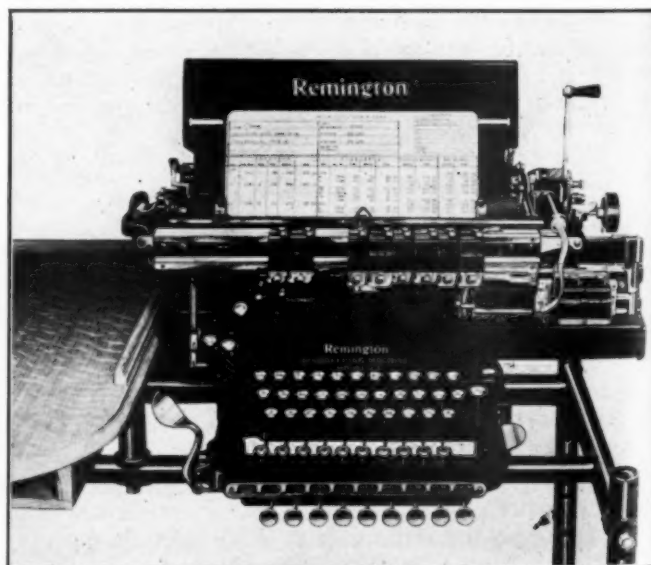


View of the Sym-Asco Journal Box Lid

pin hole in the box lug, or diameter of the pin. Its scrolls are elongated, permitting the lid to seat on all four sides of box face regardless of such inaccuracies.

Remington M. C. B. Billing Machine

THE Remington Typewriter Company, 374 Broadway, New York, is exhibiting and demonstrating a writing machine that is especially designed for M. C. B. billing. This machine is equipped with a separate



Machine Designed Especially for M. C. B. Billing—Both Adding and Writing is Performed in One Operation

adding unit for accumulating the total of each individual column—money value of materials, number of feet of lumber, weight in pounds of each classification of other ma-

terial used, as well as labor hours in quarter fractions. The classification of material varies somewhat, but usually this work requires the accumulation of from eight to ten columns. The operation of this machine is identical with that of an ordinary typewriter. The adding is a byproduct of the writing. The advantage of adding and writing these bills in one operation is obvious.

The new features of these machines include a new automatic electric carriage return, built on new principles, which insures speed of return without metallic shock. It increases the life of the machine because it causes less operating strain than a hand returned carriage. It combines an unusually rapid getaway with an air control and air cushion. The cylinder is also automatically line spaced as the carriage returns.

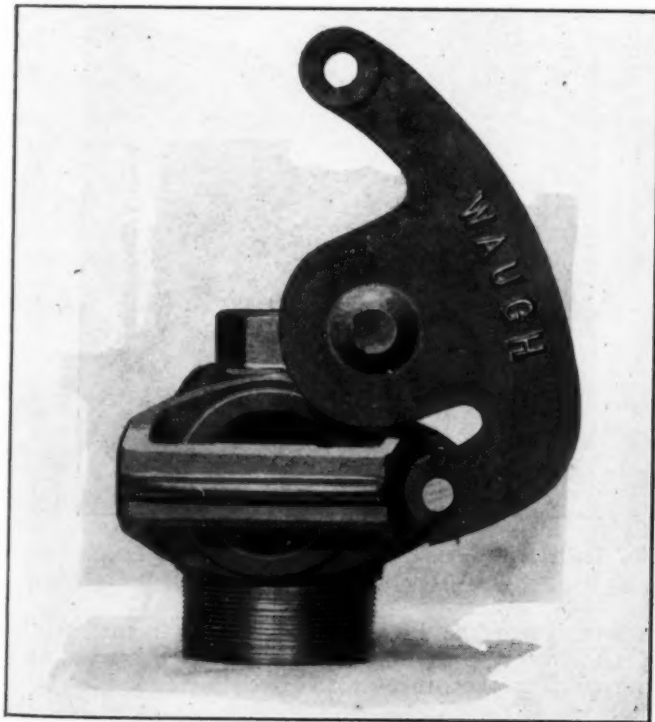
Another feature of equal importance is the new book-keeping and billing machine keyboard. The numeral keys are placed below the space bar directly under the finger tips of the operator. The rest of the keyboard is absolutely standard in relation to the space bar.

Another machine which is being shown for the first time is one for the posting of stores and material inventory ledgers. Balances of both quantity and value are computed and extended on each account at one operation. In addition to this, separate totals of each individual column are automatically accumulated.

New model machines for voucher writing and ledger posting are also being shown and demonstrated.

Outlet Valve for Tank Cars

THE Waugh Equipment Company, 122 South Michigan avenue, Chicago, is exhibiting an outlet valve for tank cars, the valve seat of which is independent of the outlet chamber so that if the outlet



The Outlet Valve in the Open Position

chamber flange is accidentally torn off the tank, the contents will not escape. The construction of the valve is such that the tank may be completely emptied through the valve. In the event of an accident separating the discharge chamber from the shell, there are no wings or

stems projecting below the bottom of the tank which would cause the valve to lift from its seat. It remains seated under vapor and liquid pressure within the tank.

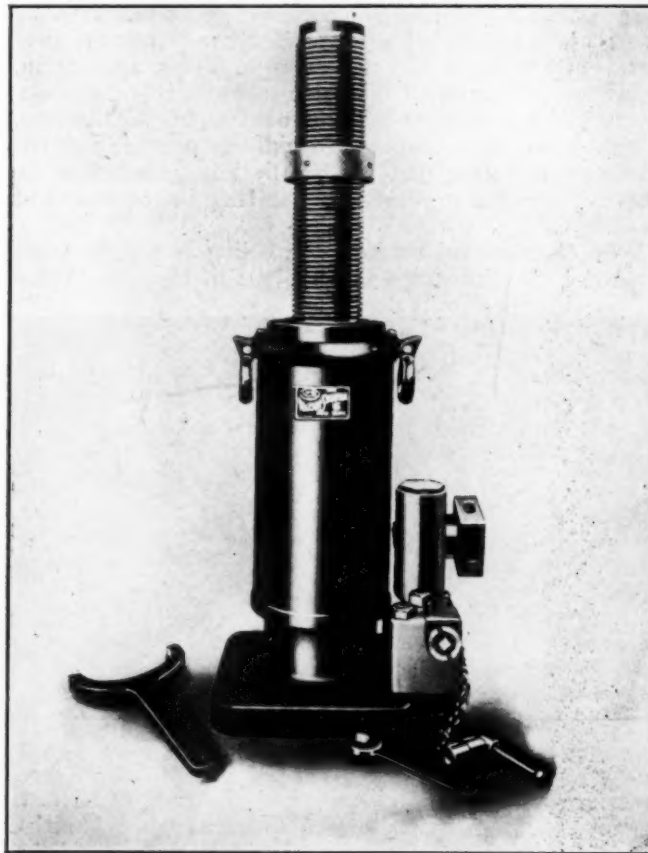
The valve chamber or the valve does not distort because of the changing contour of the shell from to the lading expansion or other usual causes and also does not tighten on its seat under the vibratory action of the stem.

The design is such as not to create a tendency to lock or wedge the valve on its seat nor does it permit side-lifting of the valve because of uneven spring tension. The valve operates from the interior of the tank. The operating gear is designed to compensate for variations in the vertical diameter of the tank produced by expansion, weight of the liquid contents or other usual causes. The operating mechanism is such that the dome cover cannot be applied until the valve is closed.

Hydroscrew Oil Jack

THE salient features of the Hydroscrew jack which is being exhibited by the Watson-Stillman Company, New York, are compactness and light weight. All the working parts and valves are outside and easily accessible. Only five of the parts making up the jack are working parts. The oil is held in a leak-proof reservoir, and as no refilling is ordinarily required, the possible danger of dirt getting into the system to clog the valves is reduced.

The ram is threaded and provided with a safety nut to



The Hydroscrew Jack with the Ram Extended

hold the load at any portion of the lift. The jack can thus be left for any length of time under full load. The ram cap is a separate piece and can be made any length to give any height of jack from the minimum of 20½-in. The jack is available in two capacities, 20 to 40 tons, and 40 to 75 tons.

Safety Arm for Davis Brake Beams

THE Davis Brake Beam Company, 1602 Oliver Building, Pittsburgh, Pa., has included in its exhibit a safety arm consisting of only two parts, thus eliminating bolts, cotters, nuts or keys to get loose and come off. This device is held in contact with the spring plank in the same manner as the Davis brake beam sup-



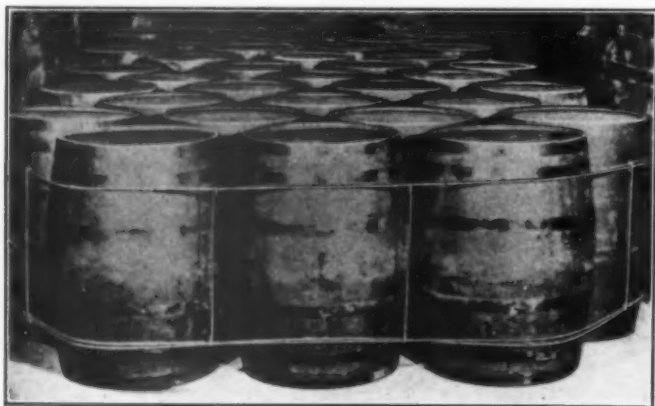
Brake Beam Safety Arm Consisting of Two Parts

port. It is not a support, however, but a safety arm, of which there are two to a truck, extending beyond the travel of the beam. Its purpose is to catch the brake beam if for any reason it should fall.

Car Lading Secured by Wire Instead of Timber

A RECENT development in the application of wire tying to car-load shipments is being exhibited by the Gerrard Wire Tying Machine Company, 1942 South Fifty-second avenue, Chicago. This application, known as the Gerrard Uni-Lastic stowage, is somewhat a reverse of the general scheme of freight car loading, namely, stowing the lading as rigidly as possible and endeavoring to retain that rigidity by heavy timbering or other means so as to prevent any shifting or movement of the lading.

With the Gerrard method, the lading is usually separated into two units, one in each half of the car. These



A Barrel Shipment Secured to the Car by Wire

units are securely bound with several strands of No. 8-gage wire applied under tension with a Gerrard Model G wire tying machine. This machine is so constructed that it can be operated by any unskilled laborer. This method of securing lading provides more permanent and greater compactness than can be obtained by the usual method of timbering. It permits no play between the component parts of the unit such as that shown in the illustration, yet the unit itself is left free to shift under severe impacts which otherwise would often damage both the lading and the car. It is only necessary for a compact mass of such

size to shift an inch or two to absorb the most severe impacts without damage to the lading.

The manufacturers report that impact tests ranging as high as 15 m.p.h. have been made without damage to the lading and that in some of these tests the lading shifted as much as 20 in. In a test of 100 cars loaded with heavy liquids and traveling a total of 96,000 miles, two cars are reported to have shown slight damage with a total loss of 15 gal. for the entire 100 cars.

Talmage Style D Hand Brake

AMONG the exhibits of the Talmage Manufacturing Company, Cleveland, Ohio, will be found the style D hand brake which differs from the older style C brake developed by this company in that the brake handle travels at an angle with the end of the car. The reason for this design is to permit the use of a sufficiently long handle to enable the brake to meet the new hand brake power requirements without using any multiplying means other than the sheave wheel. This brake is designed for one-hand operation, a hand hold being provided on the brake bracket to enable a man to hold on to the car at all times with his left hand.

In order to set the brake the pawl weight is thrown



The Brake is Operated with One Hand While Holding onto the Car with the Other

backward into the holding position which enables the operator to grasp the brake handle near the bracket and, with quick strokes, take up the slack in the brake chain, after which the handle is grasped at its outer end, in order to take advantage of the full leverage, and the brake set up tight. There is a lug on the brake handle which engages the ratchet teeth when the handle is pushed in toward the car.

To release the brake completely the pawl weight is thrown forward into the release position. The handle is raised slightly while engaged with the ratchet, which al-

lows the pawl to disengage automatically. The handle is then lowered to a point where the lug on the handle automatically disengages from the ratchet teeth and the drum unwinds. In order to release the brake gradually the pawl weight is left in the holding position while the load is taken on the brake handle. Then, while holding on to the hand hold with the left hand, there is a thumb extension on the pawl which may be pressed down to enable the handle to lower the ratchet the desired number of notches. When this point is reached the thumb is removed from the extension and the pawl will drop into the holding position.

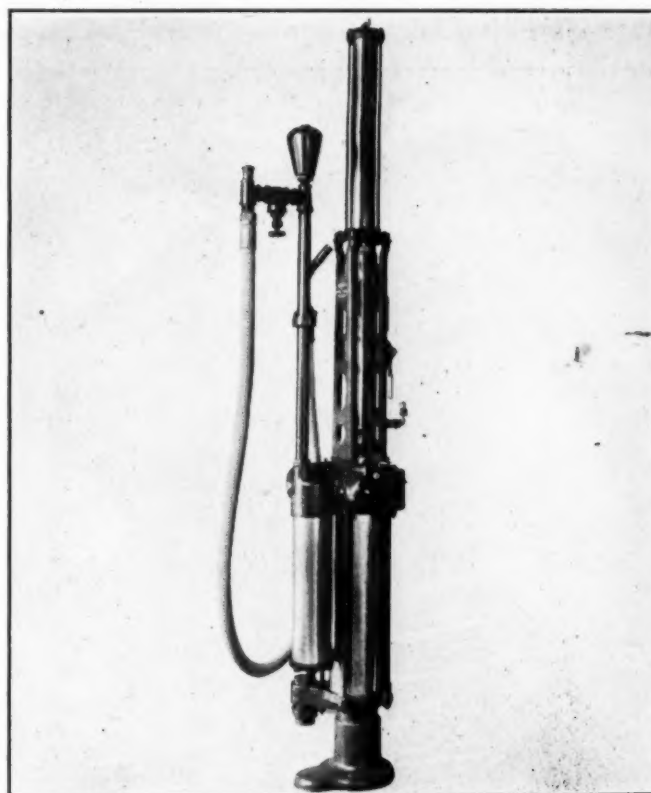
Oil Equipment for Railroad Service

AMONG the equipment being exhibited by S. F. Bowser & Company, Inc., Fort Wayne, Ind., is an air operated pump which may be installed at the end of a tank car or inside of an oil car. Power is furnished from the train line. The pump requires from 40 to 50 lb. of air pressure for very rapid discharge and since the average pressure maintained in the train line is about 70 lb., this pump can be used to advantage in delivering gasoline, kerosene and similar light burning oils. The air pressure can, however, be so regulated by means of the handle on the pump that the pump will deliver slow enough to fill an eight ounce bottle from the hose nozzle and without loss by spilling.

This pump is also designed for fueling gasoline rail cars and motor buses. It conserves the energies of the trainmen and saves time, as the gasoline tanks of most motor buses have a capacity of from 30 to 40 gal. and time is an important feature in maintaining running schedules. It may be installed in the bus garage if it is more convenient to fuel at that point or it may be installed in the bus terminal so that the gasoline supply may be replenished while passengers are loading. Installed at either of these places, power may be obtained from the air compressor used to inflate the tires of the buses.

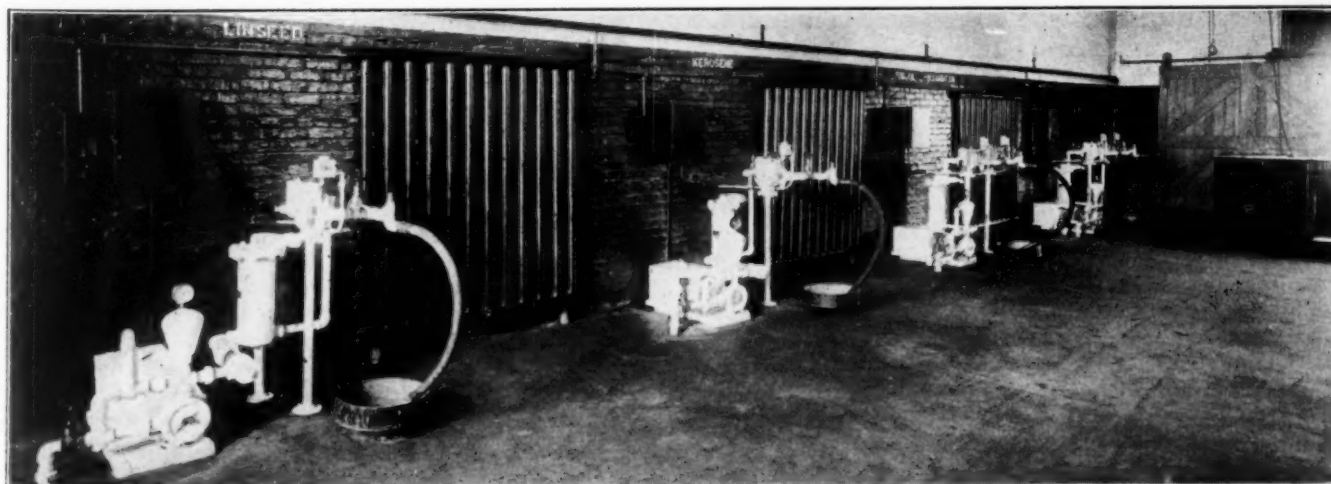
Another unit being exhibited which is of interest to the Purchasing and Stores Department officer, is the Bowser automatic control barreling unit for use in central oil houses. When a number of barrels are to be filled, a registering measure is set at the number of gallons desired

and a motor operated pump is thrown in service by pushing a trip on the unit and the liquid begins to flow into the barrel. The measure is equipped with an air release and strainer so that any air which may be contained in the lines will not cause the measure to register air for oil as it passes through. This feature insures accurate measurement. When the required number of gallons have been



Air Operated Fuel Oil Pump Designed for Fueling Gasoline Rail Cars and Busses

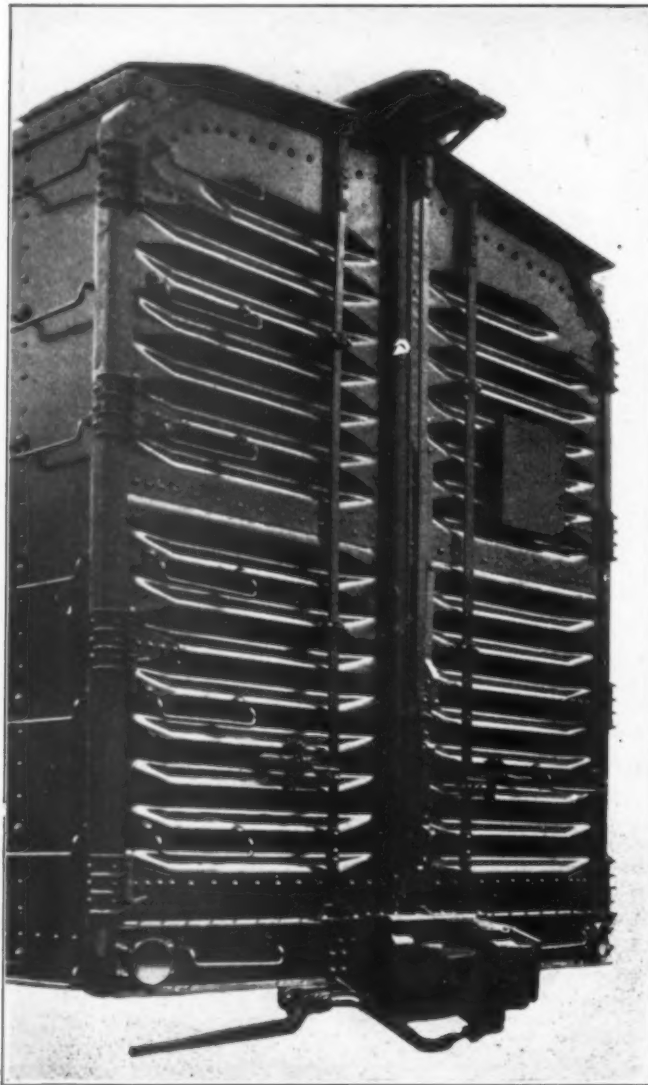
discharged into the barrel, the measure trips off automatically and the motor drive pump stops. By the use of this barrel filling unit, oils can be rapidly barreled and loaded into the supply train for distribution. During this operation no attention is required on the part of the oil house attendant.



Interior of an Oil House of a Western Railroad Showing an Installation of the Bowser Automatic Barreling Units

Murphy Corrugated Automobile End Door

IN AN effort to overcome the objections to the present type of automobile car end door, the Union Metal Products Company, 310 South Michigan avenue, Chicago, has designed and is exhibiting the door shown in the illustrations. A stiff end sill, corner post and end plate construction has been provided to hold the end of



Application of the Murphy Corrugated Automobile End Doors

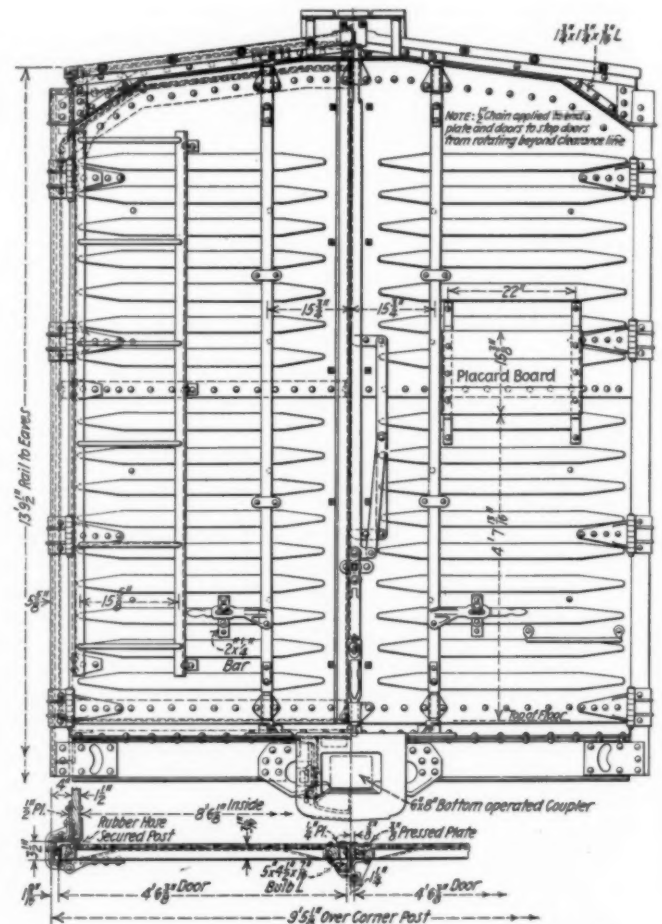
the car from distortion. The doors close in behind the corner post, relieving the hinges of any thrust from a shifting load inside of the car.

The design provides for a heavy center post construction with the post of the right door overlapping the post on the left door. Each door is provided with a Miner type refrigerator door lock, which forces the door shut for the last 3 in. and also forces it open. An additional center post lock secures the center post to the end sill and to the end plate. It also locks the two center posts together at two other points so that any load on either door from the inside is supported by both center posts.

The bottom threshold plate is sloped and there is sufficient play in the hinges to provide a tight fit at this point. The cam locks, insuring that the doors can be forced shut, with a small effort.

The door is protected at the top against water by a drip angle running across the car and at the sides against grain leakage by a rubber hose gasket.

The doors are opened or closed from the outside of



Construction of the Murphy Corrugated Automobile End Door

the car, doing away with the necessity of crawling over the load to get at them.

Scullin Truck Side Frame of Reduced Weight

THE changes of the integral side frame which is being exhibited by the Scullin Steel Company, 6700 Manchester avenue, St. Louis, Mo., consist of alterations to the outline and location of the diagonal members as well as the contour of the upper portion of the journal boxes. The result is a side frame of reduced weight and increased strength as compared with frames previously produced by this company.

The diagonal load communicating members of the new side frame are so proportioned that a line through the centers of area of the various cross-sections of each member coincides with the force line in the members when the side frame is under vertical load. To secure this coincidence, the members must have their area center lines intersect on the vertical center line of the journal.

As shown in the drawing the diagonal members are channel or U section in outline. The compression member has its web portion uppermost whereas the tension member has its web portion lowermost. The web portion of the latter is continuous but slightly curved near the

lower end. However, the line connecting the various centers of area shown by the small black dots is a smooth line. By holding the chain line or flexible cord line in the tension member, the material is uniformly stressed. This is the condition for maximum efficiency. In the compression member the force line and the line of resistance should coincide or early buckling results. The new design also provides a structure which avoids sudden or abrupt changes in the disposition of the metal.

The center of area of the medial plane marking the juncture of the diagonal tension member with the bottom tie member should and does lie on the line through the other centers of area.

Tests have indicated that the region of least stress under vertical load is at the bottom of the web connecting the diagonal tension member with the bottom tie or spring seat portion, known as the outer corner of the spring seat.



The End of the Frame After Testing—Note that, While the End Portion Has Rotated Owing to the Frame Taking a Downward Set, the Box Opening Retains its Shape

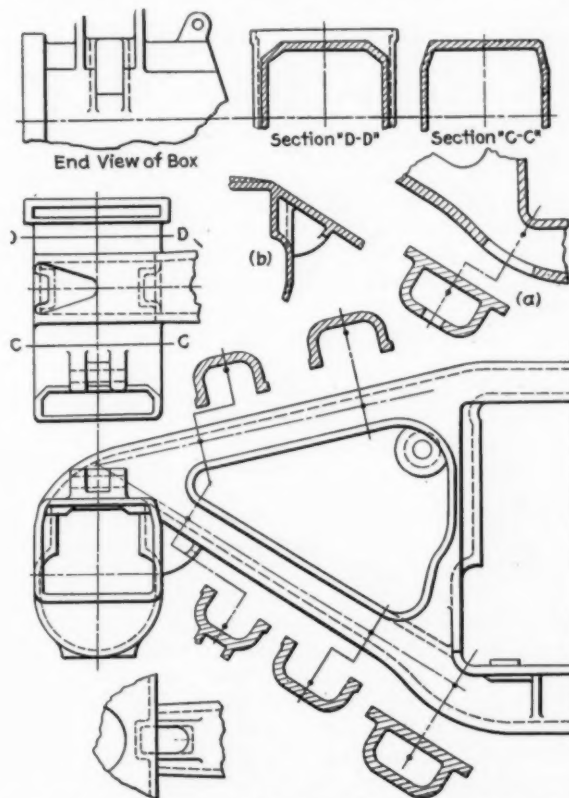
Therefore, the drain hole was located in this region of low stress intensity and it may be larger than usually provided. The larger hole facilitates the use of cores in the casting operation and is also of advantage in the removal of core sand from the casting. It also offers greater assurance that lading from the car which may find its way into the open channel portions, may be automatically expelled.

The center of area of the medial plane marking the juncture of the diagonal tension member and the tie, shown at *a* in the drawing, is slightly raised owing to the introduction of the drain hole.



A 40-Ton Capacity Frame Which Fractured Under a Vertical Load of 407,300 lb.

The journal box is beveled at its two upper side portions as illustrated in the drawing. By reason of this beveled construction the usual sharp corners are avoided



Cross-Sectional Views of Various Sections of the Scullin Side Frame

and the amount of metal is reduced. In addition, the beam length of the journal box is shortened. Furthermore, the truncated gable construction gives a more rigid and stronger design than a journal box having a flat top from side to side.

In order to shorten the beam length of the upper portion of the journal box, the web portion of the tension member is constructed so that the lower edge is in substantial alignment with the intersection of the inner edge of the corresponding wedge lug and the wedge bearing surface as shown at *b* in the drawing.

This construction, using the present standard wedge and bearing, reduces to a minimum the beam length at the top of the journal box.

The actual average weight of these frames is 520 lb. each.

Rex Metal Passenger Car Sash

THE Curtain Supply Company, Edwardsburgh avenue, Elkhart, Ind., has included in its exhibit a metal sash which has a removable metal sash guide capable of adjustment which also serves as an anti-rattler. This device makes it possible to remove the sash from the car body by removing only one screw, without in any way disturbing the paint line, and therefore making it possible for the sash to be replaced in the window opening, without any other work being necessary. The sash is equipped with special locks which are enclosed on the inside of the sash. The necessity for the ordinary lock rack is eliminated as the sash guide also serves as a lock rack.

D. & G. Refrigerator Car Specialties

A NUMBER of refrigerator car specialties are being exhibited for the first time at Atlantic City by Dromgold & Glenn, 332 South Michigan avenue, Chicago. These devices, four of which are illustrated, include a tank clean-out, brine retaining valve, door post pocket, unit hopper lining, and drain pan.

Shown in one of the illustrations is an interior view of a refrigerator car equipped with the D. & G. refrigeration installation. The tanks are made of heavy pressed steel of reinforced construction. In the bottom of each tank, which is four in. deep, are two sediment pans of heavy pressed steel equipped with handles which project up so that the pans may be easily removed. The bottom of each tank is equipped with a clean-out arrangement, the frame of which is riveted to the front of the tank. The tank cleanout-out consists of a frame of heavy pressed steel and a corrugated cover, 10 in. by 12 in., which fits against a rubber gasket. The cover is secured with a taper key, as shown in one of the illustrations.

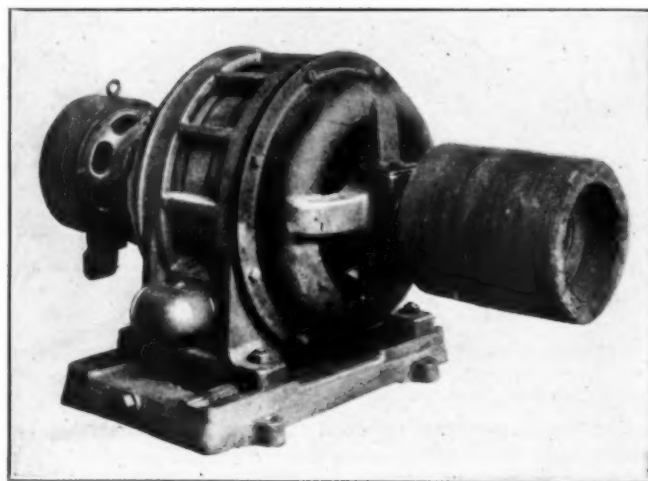
Each of the tanks are equipped with a brine retaining valve located at the side of the tank. Referring to one of the illustrations, the brine retaining valve is housed in a pressed steel shape riveted to the side of the tank. The valves are of simple construction and are adjustable under all conditions without removing the tanks. The valve and connection bar are drop forged and the valve seats are of pure gum rubber. Quick draining is insured by a 1 3/8-in. opening in each tank. The hatch plug cannot be replaced while the valve handle is in the open position.

Another refrigerator car specialty which this company has recently developed is the D. & G. door post pocket which is designed to facilitate the removal of the door post in case of renewal. The common practice of

tenoning the door post to the car sills and side plates makes a somewhat expensive repair job and there is a possibility of injury to the car when the door post is broken. Either the tenon or the gain must be cut away with the consequent weakening of the frame, or the floor and the roof of the car must be jacked apart sufficiently to lift the tenons out of the gains. The D. & G. door post pocket is designed to permit the door post to be taken out with the removal of two bolts and replacement to be made without any injury to the superstructure of the car. The threshold plate is held firmly in place by shoulders on the pocket, which takes all the strain from the screws. The design of the castings provides a stronger form of construction, as well as a water-tight joint between the bottom of the post and the car.

New Line of Synchronous Motors

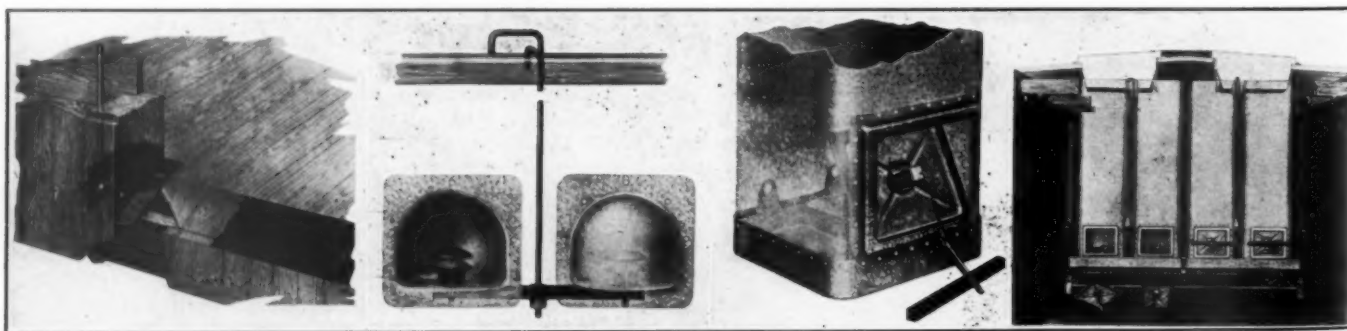
A NEW line of synchronous motors for general purpose application has been developed by the General Electric Company. These are recommended to drive any load whose torque requirements have been heretofore met with a standard squirrel cage induction



A 50-Horsepower, Six-Pole, 1200 R. P. M. Form P. K. Synchronous Motor

motor. The new motors are of the G. E. types TS and QS and are known as the 7,500 series.

These motors meet all the Electric Power Club requirements for a general purpose motor; give satisfactory starting characteristics; are of strong construction, and with minor changes, will operate at unity, 90 or 80 per



Left to Right: Door Post Pocket—Brine Retaining Valve—Tank Cleanout—Interior View of a Refrigerator Car Showing a D. & G. Installation

cent power factor. The ratings range from 20 to 150 horsepower with speeds of 1,200, 900, 720 and 600 r.p.m. at 60 cycles. The motors are rated at 40 deg. continuous at unity power factor. At 90 per cent or 80 per cent power factor the temperature of the stator will not exceed 40 deg., with 50 deg. on the rotor.

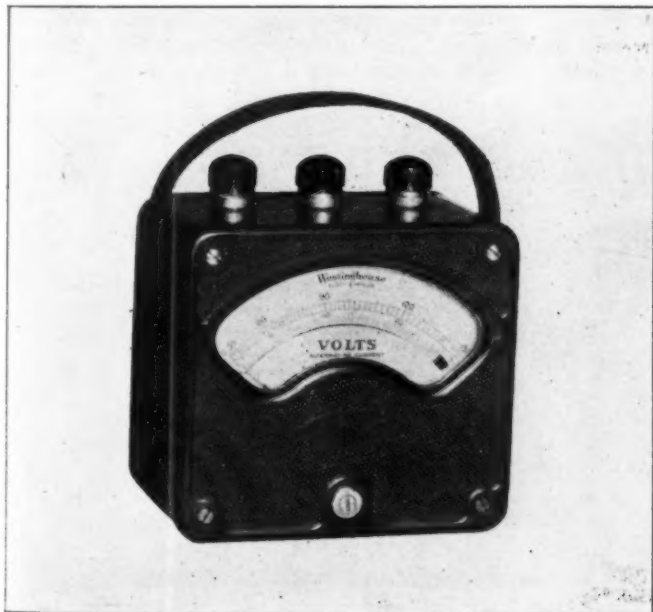
Adequate starting torque is the most important feature in the design of the new motors, each motor being guaranteed to deliver the same starting torque with the same inrush current as the standard squirrel cage induction motor of similar rating. At full line voltage the motor will accelerate and synchronize a load whose torque is 100 per cent of the rated full load torque of the motor.

The motors are of the revolving field, salient pole type and are separately excited, usually by means of direct connected exciters. One of the principal advantages is in the amortisseur windings so designed as not to be a limiting feature in regard to heating. These starting windings will not become dangerously heated before the primary motor coils are overheated. Thus adequate overload protection in the a.c. lines will also protect the amortisseur windings from overheating resulting from failure to start, or because of operation without excitation.

With these motors, semi-automatic control is recommended, by means of which the field excitation is automatically applied. The motor is started by a manually operated, self-contained compensator. The operations required to start are therefore identical with the starting of a squirrel cage induction motor.

Portable Meters for Alternating or Direct Current

THE Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has introduced a new set of portable indicating instruments that may be used for both alternating and direct currents. After a complete analysis of the requirements a non-residual iron was de-



A Voltmeter Typical of the New Line

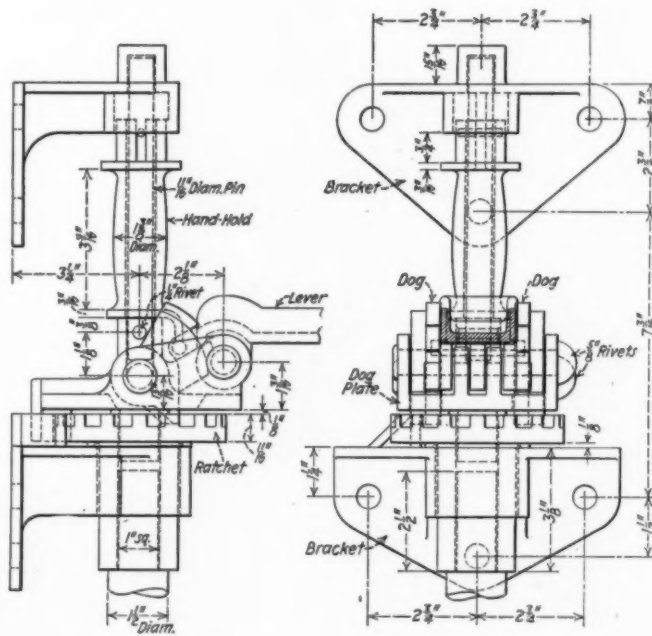
veloped for use in the construction of these instruments, to enable them to function properly for both kinds of current. This complete set of indicating instruments, includes an ammeter, voltmeter and single phase wattmeter.

A beautiful mahogany-veneered, one-piece Micarta case has been designed for the meters, which is strong, resists acids and is of dust-proof construction. It is made in one piece with its inner layers of the same micarta that is used for industrial gears. A tightly fitting nickel-plated brass ring, lined with felt, prevents any dust from entering the box once the meter is inserted. As a protection to the meter when it is not in use, a lid of the same finish as the box itself is provided.

The handle is made of leather and is attached to two nickel-plated brass lugs; it can quickly be replaced in case of damage.

Ratchet Hand Brake for Freight Cars

A PART of the exhibit of the Union Railway Equipment Company, Chicago, is a new ratchet hand brake for freight cars. The brake can be set, eased off, or fully released with the lever handle, without the operator changing position. In the event that the brake staff, when released, does not fully unwind the chain, it is frequently necessary to use a wrench to turn the staff back. This condition may result from a brake staff that has been bent in service, causing it to bind at



The Ureco Ratchet Hand Brake

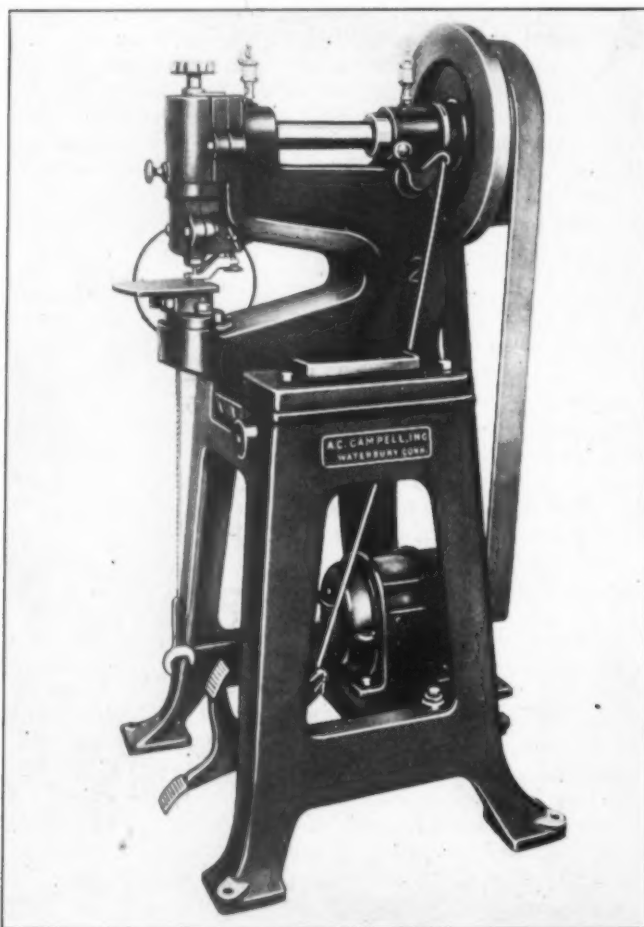
the brake step or end sill. The Ureco brake is designed with two ratchet dogs held in the dog plate by two $\frac{5}{8}$ -in. rivets. One dog is dropped into the ratchet for applying the brake and the other dog is used for reversing the brake when necessary to unwind the chain.

The Ureco brake has a safety grip which provides a handle for the operator. This grip, which is $3 \frac{9}{16}$ in. long and curved to fit the hand, is located on the brake staff just above the dog plate. The grip is conveniently located with regard to balance and the safety of the operator and is ideal as to leverage conditions. The ordinary foot-operated ratchet and pawl is used.

The brake can be applied to cars now equipped with the ordinary shaft and wheel with a minimum amount of expense and change.

Nibbling Machine for Cutting Odd Shapes

THE American Chain Company, Bridgeport, Conn., is exhibiting a nibbling machine which is designed primarily for the cutting of odd shapes. This machine, known as the Campbell nibbling machine, is made in three sizes and performs the cutting or "nibbling" operation by means of a specially constructed punch which reciprocates rapidly above a die. This punch differs from the ordinary type in that in the center of the biting end is a stop pin. The work is pushed against this pin, the end of which remains in the die for the duration of the stroke. The location in the center of the end of the punch provides for not only a nibbling operation, but for uniform feed which results in a rapid small-biting operation, leaving a comparatively smooth edge on the



Nibbling Machine for Cutting Cams, Gaskets, Templates, Discs and Pieces of Odd Shape from Sheet Metal

shape being cut. This, of course, reduces to a considerable extent the work of finishing.

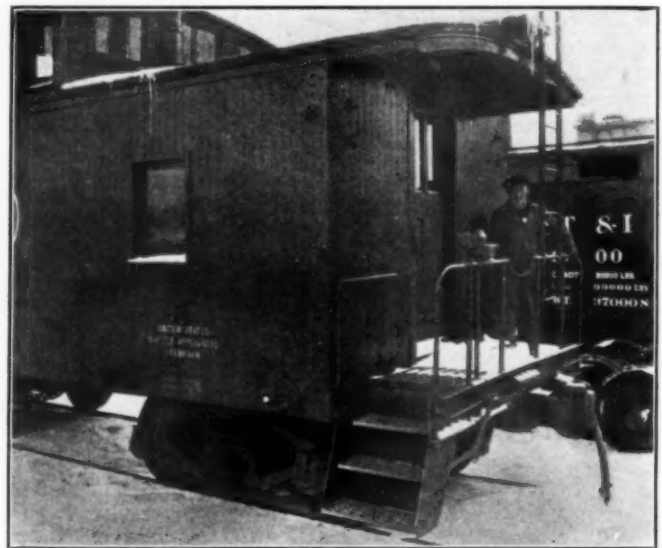
The machines are either belt or motor driven and the rapidity of action is such that from 20 in. to 30 in. per min. can be cut in either direction. The operator can cut from either a scribed outline or from a template. Stock up to and including $\frac{3}{8}$ -in. mild steel can be cut on these machines. The machines occupy a floor area of about $3\frac{1}{2}$ ft. by $2\frac{1}{2}$ ft. and are operated by either one-half hp. or one hp. motors, when an electric drive is used.

The Campbell nibbling machine is recommended for such work as cutting out special safety guards, core box

facings, shims, gages or discs for either model or experimental machines, or for standard equipment where duplicate pieces are unavailable.

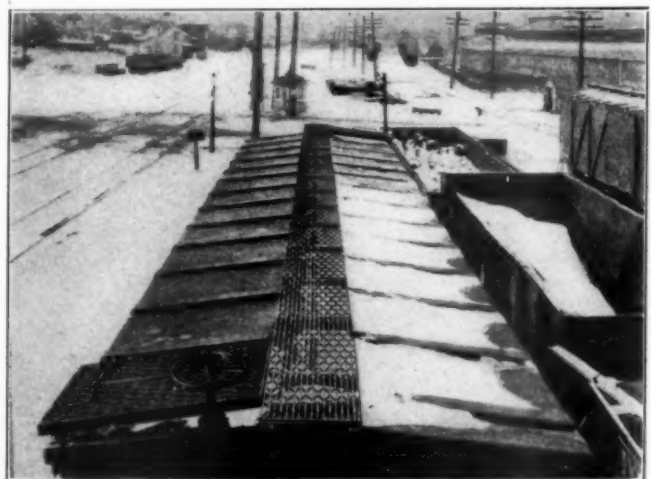
Irving Safkar Running Boards and Steps

THE Irving Iron Works Company, Long Island City, N. Y., is exhibiting an open metal construction for freight car running boards and passenger car and locomotive steps. It is built up of steel bars in two different depths, placed on edge and riveted solidly



Snow Falls through the Openings of Safkar Steps

together with all edges flush on the top face. The "reticuline," or crimped bars act as trusses, which stiffen and strengthen the deeper straight bars so that there is no racking or warping. The placement of the edge-on bars provides a smooth working surface with a safety footing



A Box Car Provided with a Safkar Running Board

that grips, but does not bite. Each section is a stiff, self-braced panel designed to resist distortion.

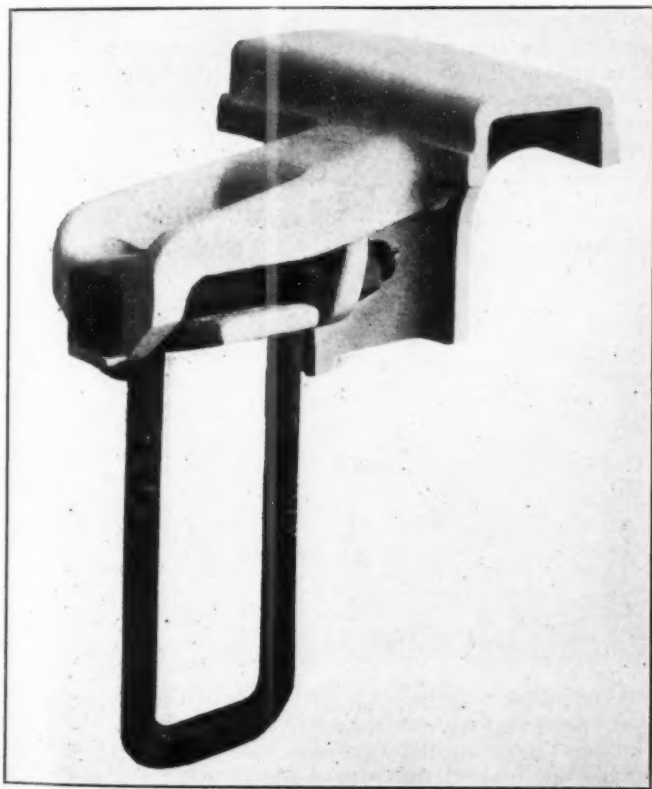
The crimped bars are of less depth than the straight bars, so that the openings are larger beneath than at the top. Thus, the collecting and compacting of dirt, cinders,

snow or ice in the mesh is prevented, the jar and vibration of the moving car shake them through, leaving a clean, smooth, surface.

The grating used is the standard Iving Type G, with rivet spacing 7 in. center to center. The straight bars are $\frac{3}{4}$ -in. by $\frac{1}{8}$ -in. steel, the reticulate bars, $\frac{1}{2}$ -in. by $\frac{1}{8}$ -in. steel. The straight bars are rigidly supported at the top chord, where the buckling stress is greatest, by the adjoining reticulate bars. The truss construction distributes the load and stock among many members. The running board is fabricated in panels of suitable length, held in a frame of $2\frac{1}{2}$ -in. by $\frac{1}{4}$ -in. steel. Additional supporting cross-bars, spaced about 30 in., at right angles to the grating, are solidly riveted to the surrounding frame. This construction gives maximum load capacity, with a minimum of dead load.

Buckeye Cast Steel Brake Hanger Bracket

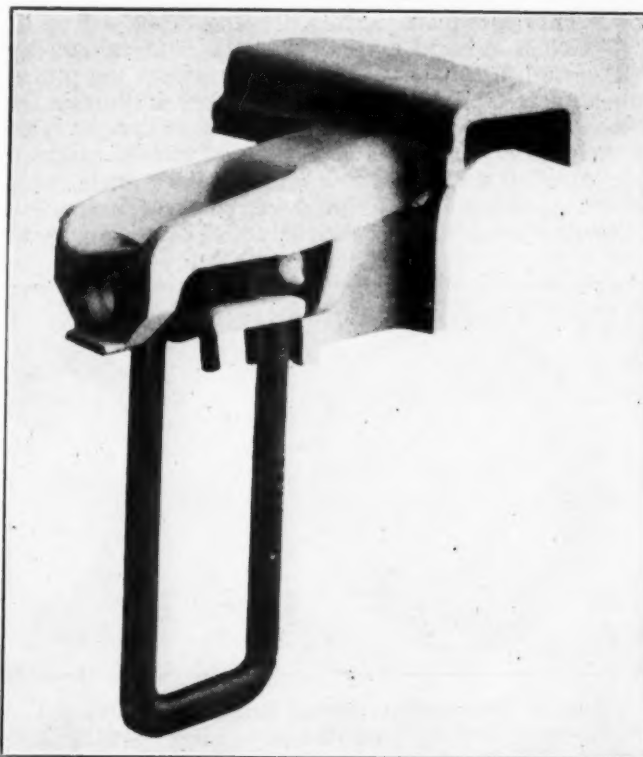
THE Buckeye Steel Castings Company, Columbus, O., is exhibiting truck side frames fitted with several types of brake hanger brackets and brake beam hangers. Among the exhibits will be found a type of



Type of Brake Hanger Bracket Designed for Use With Open or U-type Hanger

integral brake hanger bracket on the truck side frame which has been designed to provide for the use of the open type brake hanger and also the continuous loop type of hanger. The illustrations accompanying this article show the details of the hangers, together with their types of attachments and details of the integral bracket on the side frame that meet the requirements suggested in this year's report of the Car Construction Committee. The

use of these brackets involves a somewhat more complicated casting, which is slightly increased in weight.

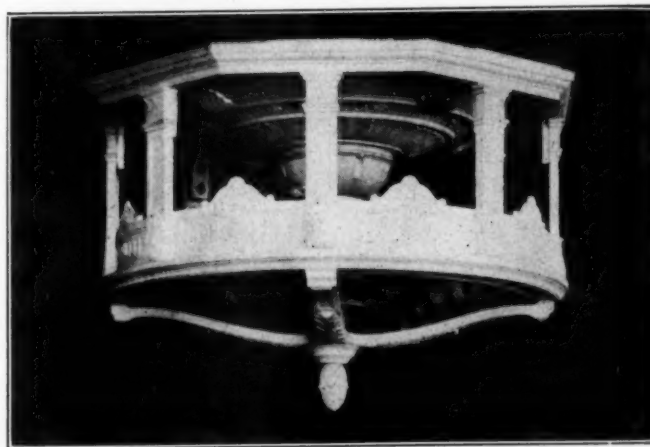


Type of Brake Hanger Bracket DeSigned for Use With Loop Hanger

Added hanger security and greater accessibility for inspection are secured.

Electric Fans

THE Safety Car Heating & Lighting Company, New Haven, Conn., has developed an electric fan for railway passenger cars along somewhat radical lines as is clearly indicated in the photograph. When first introduced it was received cautiously, but later its



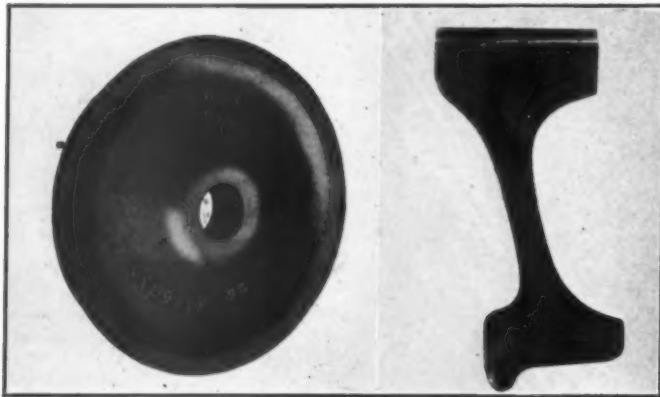
A Fan Which is Ornamental as Well as Practical

advantages were recognized and now its acceptance is quite general and its use is standard on many railroads.

The company is introducing this type of electric fan into commercial fields other than railway cars. The decorative possibilities of this type are an important factor.

Griffin Single Plate Car Wheel

THE single plate car wheel, being developed by the Griffin Wheel Company, Chicago, and exhibited at Booth 620, is a radical departure from the present double plate type of design. Researches at Purdue and Illinois universities early disclosed the fact that the metal of the double plate wheel was not economically placed to take care of the stresses of greatest magnitude which arise from sudden heating of the tread through excessive brake-shoe friction. The brackets and back plate in the



Back View and Section of Griffin Single Plate Car Wheel

double plate design lend little assistance to resist the stresses arising from vertical load and unequal heating. A desirable condition in design is that there shall be no sudden changes in section, such as occur at the intersection of the double and single plate and at the intersection of brackets and plate. These inequalities in a section result in unequal rates of cooling while the wheel is in the process of manufacture, thereby producing internal stresses that may not be entirely removed in the pitting process. The design of the single plate wheel is made to



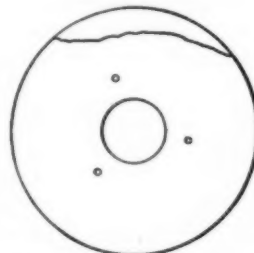
Section through the Rim and Flange, Showing Grain Structure

avoid all these undesirable conditions by eliminating the pan core, the core leg openings, chaplets and all possibility of unequal plate thicknesses, etc.

The back view of the wheel indicates the entire absence

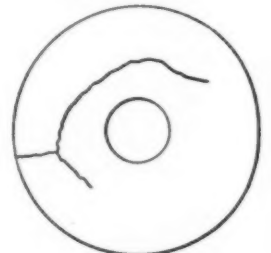
of brackets and the elimination of all sharp angles. The hub metal is also so distributed that it offers greater resistance to the stresses that are developed while being pressed onto the axle. One of the photographs shows the section of the single plate wheel on exhibition in the Griffin Wheel Company booth. The design indicates a far more homogeneous relationship between the different parts of the wheel from the standpoint of heat treatment than is possible to secure in any design where brackets

650 lb. Double Plate
No. 999129



3" Ring Cracked 2 min. 52 sec.
Broke 3 min 14 sec.

650 lb. Single Plate
No. 999133



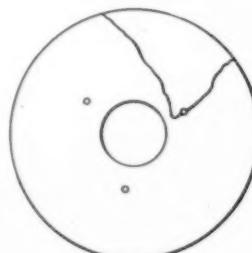
3" Ring Stood Until Cold
2" " " " " "
2" " " " " "
3" " " " " "
3" " " " " "
Broke 12 min. 20 sec.

Comparative Results of Thermal Tests of Single and Double Plate Cast Iron Wheels

and separation of the plates are involved. The enlarged view of the rim and flange shows the important grain structure produced by the use of lip chillers, a new Griffin development which entirely eliminates the sand rim.

Comparative drop and thermal tests tend to indicate the superiority of the single plate design. The results of

700 lb. Double Plate
No. 999147



28 Blows

700 lb. Single Plate
No. 999151



31 Blows

Comparative Results of Drop Tests of the Single and Double Plate Cast Iron Wheels

tests of single and double plate wheels of the same weight, cast from the same metal and pitted together in the same pit, are shown in the two sketches. It is said that no double plate wheel was ever made showing the resistance to temperature stresses as indicated by the test of the 650-lb. single plate wheel.

The new type of wheel has been in service under locomotive tenders in various parts of the country, extending from the Atlantic to the Pacific, and in especially severe service in the copper regions of the Rocky Mountains and on logging roads where severe brake service is encountered; also under heavy high speed interurban cars.

In order to obtain more data on service performance, patterns of the four A. R. A. standard weights of wheels, namely 650 lb., 700 lb., 750 lb., and 850 lb., have been made and everything indicates that during the next two

years a sufficiently large quantity will be in service to demonstrate the desirability of the single plate design. There are about 22,000,000 chilled iron car wheels now in service on American railroads. A comparison of the performance of the Griffin single plate wheel, with the present standard, can only be determined by placing a large number of the new design in the various classes of railroad service.

Mechanical Painting Device for Applying Car Cement

THE Milar, Clinch & Company, 133 West Washington street, Chicago, is exhibiting a new design of mechanical painting equipment which is suitable for applying paint, varnish, lacquer or car cement. The nozzle is a single casting designed somewhat in the shape of a "Y". The straight side of the casting is internally screw threaded for receiving two nozzles and the lower side of the casting is internally threaded to receive a connection to the source of air supply. The intake nozzle is of an elongated cylindrical type, screw threaded so as to fit into the intake side of the casting, the end of the intake nozzle being beveled so that it gradually becomes smaller towards the forward end. The outlet nozzle is beveled on the inside in an opposite direction so that the intake nozzle fits in the tapered beveled portion of the outlet nozzle. It is screw threaded to fit into the outlet side of the casting directly ahead of the intake nozzle. By screwing the outlet nozzle either forward or backward, the size of the air vent may be



The Nozzle is Cast in the Shape of a Y, the Air and Material Pipes Being Screwed into the Top Ends

either increased or diminished so that it will be of the proper size to permit a sufficient amount of air to pass through to atomize material of the consistency of No. 1 car cement, which is a heavy liquid.

A 12-in. or 14-in. nipple is screwed into the air side of the casting and a $\frac{3}{8}$ -in. gate valve or globe valve is applied to the nipple, as shown in the illustration. Attached to the inlet end of the intake nozzle is a 45 deg. ell to which is applied a 12-in. or 14-in. by $\frac{1}{2}$ -in. nipple with a $\frac{1}{2}$ -in. cut-out cock. A $\frac{1}{2}$ -in. air hose leads directly from the yard line to the $\frac{3}{8}$ -in. gate valve on the air side of the spray nozzle and a $\frac{3}{4}$ -in. hose is connected to the

$\frac{1}{2}$ -in. cut-out cock leading to the material pressure tank for the purpose of supplying material to the spray gun.

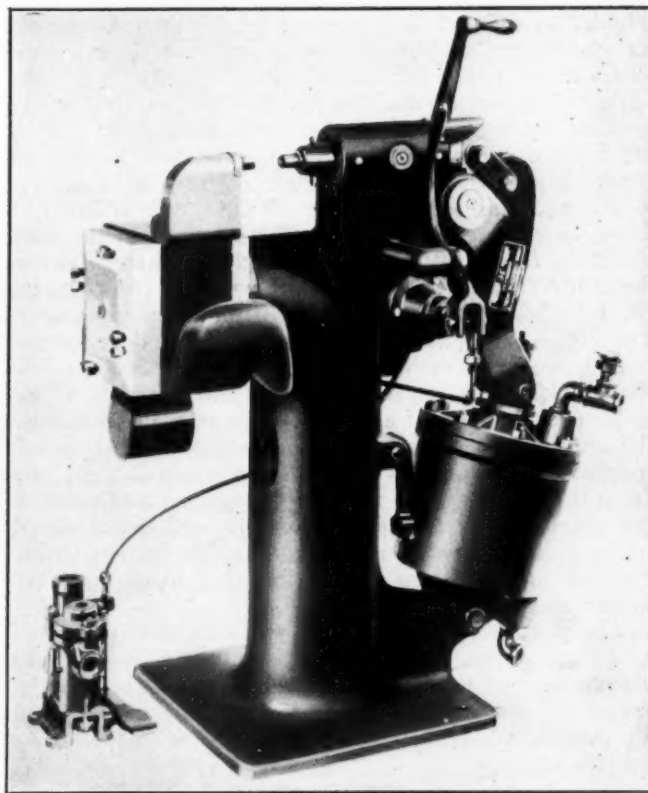
The material pressure tank should be of about 25 or 30 gal. capacity, but may be as large as desired, tested to not less than 150 lb. working pressure, with a 4-in. filling plug at the top and also a $\frac{1}{2}$ -in. opening in the top for receiving compressed air to force the material through the hose to the nozzle.

A $\frac{1}{2}$ -in. nipple is screwed into the $\frac{1}{2}$ -in. air intake opening on the top of the tank. A $\frac{1}{2}$ -in. tee connection is applied, to one side of which is connected a 50-ft. or 25-ft. length of air hose leading directly to the yard line. On the opposite side of the tee connection is attached a $\frac{1}{2}$ -in. nipple and a $\frac{1}{2}$ -in. ell to which is applied an air gage. On the top outlet of the tee a $\frac{1}{2}$ -in. nipple is connected for a safety valve set at 100 lb. pressure.

The operator first opens the air side of the nozzle by turning the $\frac{3}{8}$ -in. gate valve and then gradually opens the cut-out cock on the material side of the gun which permits the material to flow to the nozzle. As it passes from the intake nozzle to the outlet nozzle, it is thoroughly atomized and applied in an even coating with practically no clouding of the atmosphere surrounding the operator.

Riveter Designed for Rapid Production

A NEW design of riveting machine that is being exhibited by the Hanna Engineering Works, 1765 Elston avenue, Chicago, is shown in the illustration. The principal features in the design of this machine



Hanna Riveters with Four-Position Turret

is the provision of an air cushion at both ends of the piston stroke, a combined lubricating system, and provision for adjusting the piston packing from the outside.

The mechanism is a combination of simple lever and

toggle which combine a long die stroke with a wide range of uniform pressure, which eliminates the necessity of a screw adjustment on the die. The die travel is quite rapid as the die approaches the work. The die or plunger speed gradually decreases until it enters the uniform pressure area of the stroke; hence the pressure is uniform. The advantage of this die stroke is that where the work is lightest, the speed is greatest. As the rivet head forms, the pressure increases, reaches a maximum and maintains it for several inches of piston travel. Ordinary variations in rivet lengths and plate thicknesses are automatically taken care of by the wide range of uniform pressure.

The turret head has a spindle which rotates in a long hole through the large barrel of the riveter frame. It is of alloy steel, heat treated, and is machined to fit in the bearings at each end of the barrel. It meshes with interrupted thrust grooves in the wall of the barrel, making a breach lock construction to resist the riveting thrust which tends to pull the turret spindle out of the barrel.

The turret head is locked in the positions that bring each of the four noses into alinement by means of an index pin which engages with four holes spaced around the cylindrical surface of the turret spindle. These holes are bushed with hardened sockets which have slots cross-wise of their axes. The walls of these sockets are tapered to conform to wedge-like flats on the index pin at the end which enters the sockets. The axis of the index pin intersects the axis of the turret spindle and is perpendicular thereto. The taper of the wedge end of the index pin is self-locking against rotation of the spindle. The index pin is of tool steel, hardened and ground, and is air actuated in both directions.

The double acting air cylinder is supplemented by a hand lever. The spindle is rotated by a hand crank, which, is also coupled to the valve of the index pin air cylinder so that crank movement longitudinal of the turret spindle pulls the index pin, and reverse movement forces the pin into the turret spindle.

To index the turret from one position to another, the operator moves the end of the hand crank about 3 in. to the front and thus pulls the pin. He then rotates the crank 90 deg. about the spindle axis, bringing the turret to the next position. Release of the crank allows it to move back to neutral position which results in the index pin being forced into the spindle and held there. Moving the crank further back releases it partially from the turret spindle so it may be rotated independent thereof. Therefore, the crank, though limited to 90 deg. rotation, is effective in revolving the turret through 360 deg. As the crank is moved to the front and rotated, a hook slides over in front of a 90-deg. segment plate, preventing the crank from centralizing longitudinally while in mid-rotation. This assures that the index pin is held away from the spindle while the latter is rotated and precludes the possibility of the pin scoring the cylindrical surface of the spindle between index holes. The primary considerations in the design of the indexing mechanism were quick operation and accuracy.

The riveter is locked in two or more index positions by a vertical pin in the lower portion of the frame column which engages holes in the base. This pin is geared by a pull rod and bell crank to the turret index pin cylinder so that it pulls both pins as does also the supplementary hand lever.

Movement of the riveting mechanism is controlled by one of the standard operating valves manufactured by the Hanna Engineering Works and is foot operated. The operator steps on a heel pedal and the rivet die advances. Lifting the heel reverses the valve and the die returns. When the riveting die is clear back, the valve is brought to neutral position by a Bowdin wire from the riveting mechanism. This accomplishes the double purpose of shutting off the air intake on the return stroke at the

instant the riveting die is returned. This prevents a useless rise in cylinder pressure and excludes all air from the riveter during the intervals between riveting strokes.

The operating valve combines a soft disc poppet type stop valve with a spool type distributor valve. The poppet is seated when the heel pedal is centralized and air is shut off at the inlet. The ease with which the valve is actuated, merely rocking the foot from toe to heel, combined with the rapid riveting mechanism and quick indexing, all make for high production. The riveter may be operated as fast as 50 cycles per minute. The machine occupies a floor space of 30 in. by 40 in. and is 45 in. high.

Oxweld Car Inspector's Lamp

A CAR inspector's carbide lamp, a product of the Oxweld Railroad Service Company, is being exhibited by the Union Carbide Sales Company, 30 East Forty-second street, New York. The carbide gas yields a flame of great intensity and yet its light is agreeably soft. The flame has great illuminating power which is characterized by its diffusion and it is said not to fatigue the eye.

When necessary to charge the lamp 8 oz. of carbide is



An Acetylene Car Inspector's Lamp

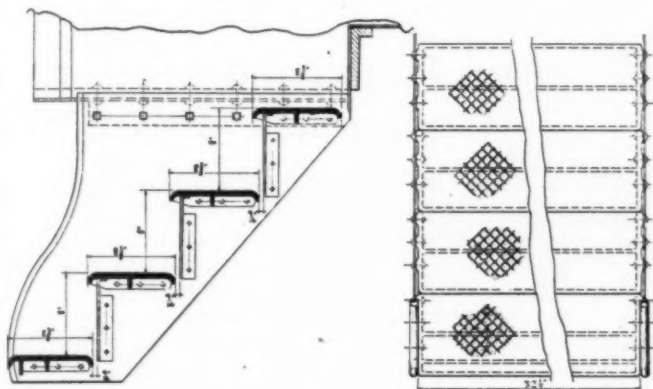
placed in the lower chamber. This burns for 10 hrs. The dropping of the water from the upper chamber of the lamp onto the carbide is controlled by a knob at the top of the lamp. After lighting, the lamp is automatic, requiring no adjustment or regulation.

The lamp illustrated herewith is 11 in. high, with a base diameter of 5 3/4 in. The base clearance of 1 in. permits the lamp to set on uneven surfaces. The lamp body is made from drawn steel, heavily tinned, and the base and handle are welded to the lamp body. The handle is made of 3/4-in. heavy band steel.

The flame is enclosed by an aluminum housing and heavy plain glass. A 2 1/2-in. removable nickel silver reflector securely fastened within the housing projects a 50-candlepower beam of light 75 ft. The lamps weigh 2 3/4 lb.

Anti-Slip Passenger Car Step Treads

THE American Abrasive Metals Company, 50 Church street, New York, has included in its exhibit its new sign of Feralun anti-slip treads for passenger cars. It will be noted from the illustration that only the lower step has two lugs, which lightens in weight the other three steps, the support being given by the riser which has a right angle turn on the upper edge.



Passenger Car Step Treads with a Single Lug on the Upper Three Steps—Note the 9/16 in. Drainage Aperture at the Rear of Each Step

Drainage at the rear of each step is through a 9/16-in. opening which is of sufficient size to prevent clogging by dirt.

Feralun treads are made of a specially selected mixture of iron with abrasive grit embedded in the surface at the time of casting. The grit projects slightly above the surface and "bites" so that slipping on it is prevented. The treads are made $\frac{3}{8}$ in. or more in thickness requiring no sub-treads, or $\frac{5}{16}$ in. thick to be used on top of other materials.

High Capacity Helical Truck Springs

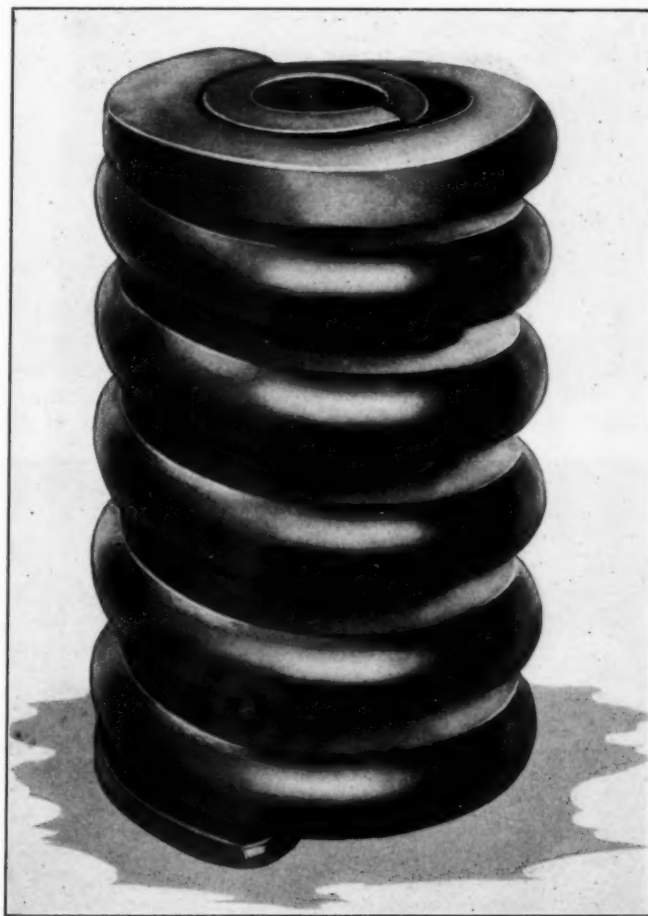
THE unsatisfactory service of truck springs, especially those used with 50-ton and 55-ton freight cars, has, in recent years, been a constant source of trouble. Realizing this situation, the Mechanical Division of the American Railway Association has made various efforts to overcome it.

In 1921, special designs of springs were prepared to give increased capacity and travel and were adopted as tentative standards. The specifications for these springs called for chrome-molybdenum alloy steel. Results with this material were unsatisfactory and in 1925 the specifications were withdrawn. At that time a proposal was made to increase the capacity and movement of truck springs by increasing the stress. This high stress would require the use of expensive alloy steel which is extremely unreliable when subjected to torsion, such as exists in helical springs. Because of this fact, the design proposed in 1925 has not given the results that were expected.

As a means of overcoming the trouble caused by truck springs breaking or taking permanent set, The Bradford Corporation, New York, has brought out and is exhibiting at its space on the pier, a new spring made from a bar

of special section. The material used is carbon spring steel with special silicon content, heat treated. As compared with the standard Class D truck spring, this design is said to give $18\frac{1}{2}$ per cent. more movement and 29 per cent. more capacity. The double coil springs have the same outside diameter and free height and are, therefore, interchangeable with the Type D spring.

One of the important characteristics affecting the closure and breakage of springs is the amount of impact



The Section of the Bar, Circular on the Outer and Inner Faces of Coils, Has a Greater Area and a More Uniform Fiber Stress Distribution than a Circular Section of the Same Dimension Parallel to the Axis of the Coils

required to close the spring when under load. In this respect the new design shows a great advantage. A group of four standard double coil springs under a fully loaded car requires an impact of 2,922 ft.-lb. to close it, whereas the corresponding group of flattened round section requires 5,320 ft.-lb., an increase of 82 per cent. The available travel beyond the maximum load is 0.69 in. for the standard spring and 1.06 in. for the new type.

The high capacity under impact enables this spring to withstand the forces set up by swaying of the car body when passing over rough track, which is believed to be the principal cause of springs going solid in service. The increased spring travel prevents concentration of the load on opposite corners of the car body, due to high or low spots in the track. Since the spring coils are no larger than the Class D spring, they can be placed close to the transverse center line of the truck as in the A. R. A. standard design, thus avoiding unequal deflection and consequent high stresses which result when some of the springs are located at a considerable distance from the truck center line.

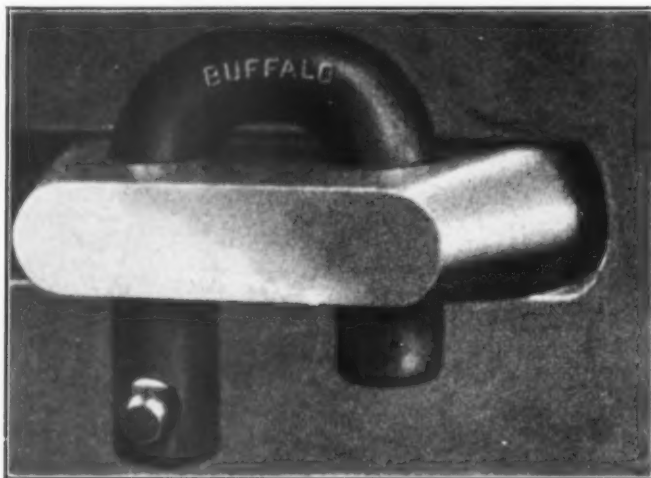
The results of springs going solid in service are not

confined to breakage of the spring itself. Tests have demonstrated that a slight impact above that required to close the truck springs would cause permanent set in the side frames and is probably responsible for breakage of side frames and truck bolsters.

Springs of similar design have been used in draft gears for six years with excellent results. The stress in the truck spring is well within safe limits, and in a life test of such a spring carried to 50,000 compressions from free to solid, no sign of distress or failure developed. These considerations suggest this type of springs as a practical solution of the problem of truck spring failures without sacrificing interchangeability with existing A. R. A. standards.

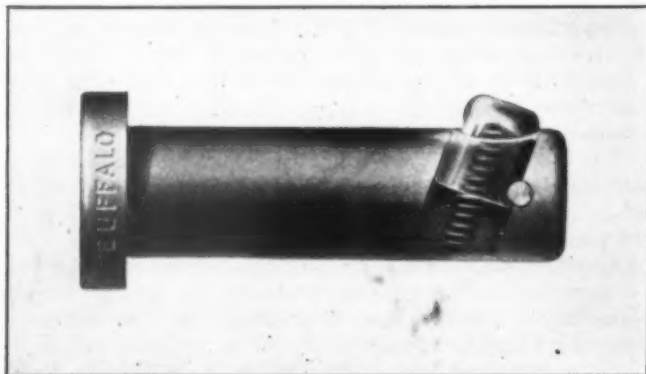
Self-Locking Draft Key and Brake Pin Lock

THE Buffalo Brake Beam Company, 32 Nassau street, New York, is exhibiting a draft key lock, the purpose of which is to provide in simple form the strength and maximum shearing surface essential to protect the draft key from the weaving motion of the



Draft Key is Prevented from Coming Out by a Self-Locking Pawl

coupler. The lock is in the form of a U made from 1 3/32-in. diameter bar. In place of the usual cotter key, a self-locking pawl of hardened steel is used. The pawl



Self-Locking Pawl Applied to a Brake Pin

is fitted into the end of the key at a 19-deg. angle. It is prevented from coming out by a small set screw which, after being put in place, is riveted over. The side of the

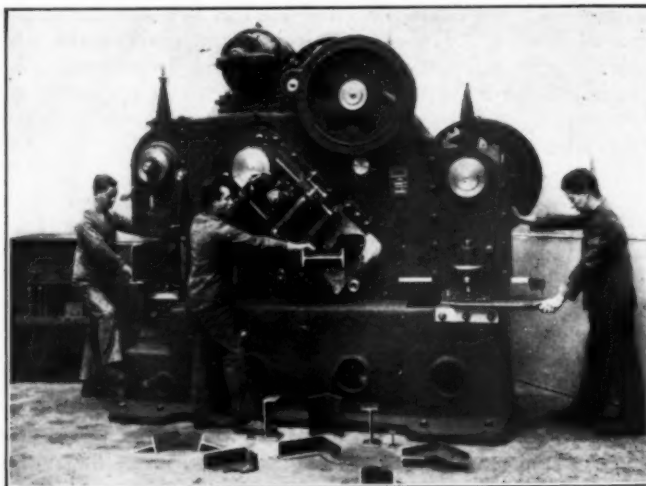
pawl in which the set screw fits is machined out to allow a movement in and out of the pawl pocket of 1/2 in. in compression against a spring made of Monel metal, which fits in the bottom of the pocket. The pawl cavity is packed with nonsoluble grease and the use of Monel metal for the spring eliminates corrosion, thus prolonging the life of the spring and preventing the lock from becoming inoperative.

This principle of a self-locking pawl has also been applied to brake pins, the construction of which is illustrated in the accompanying phantom view of the brake pin, which is also being exhibited.

Universal Punch and Coping and Mitre Shear

THE Schatz Manufacturing Company, Poughkeepsie, N. Y., is exhibiting a plate, structural and mitre shear, and universal punch and coping machine on which three operations can be performed at one time. On the one end is the plate shear with an enlarged passage in the frame for the unhindered shearing of large plates with minimum bending and twisting of the plate. The clutch is operative in any position of the eccentric, which engages and disengages automatically. An automatic plate separator is provided as well as an indicator to locate the line of cut.

The structural steel and mitre shear is located in the middle of the machine. It will cut angle and tee-iron without change of blades at right angles, also any desired inner or outer mitre from 45 to 90 deg. The universal blades provided for cutting channels and I-beams have



Type CPE Machine in Operation Coping a Flange, Shearing a Channel and Splitting a Plate

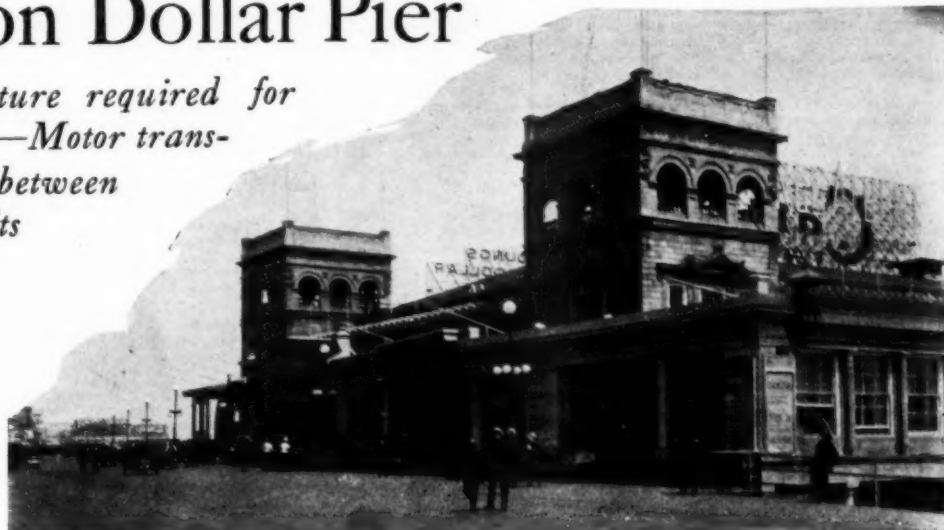
inserted, adjustable and regrindable cutting faces.

For punching, a steel clutch coupling is provided which can be instantly thrown into engagement by hand or foot trip. The slide may be automatically stopped in the highest position, or, if desired, continuously operated stroke by stroke without disengagements of the clutch.

The following specifications are for the machine shown in the illustration. The strokes per minute for plate and structural shearing and for punching are 17, 16 and 19, respectively. The diameter, width and r.p.m. of the pulley is 23 3/4 in., 4 3/4 in. and 350 r.p.m. When belt driven, a 15-hp. motor is required and, when motor driven, 20 per cent more horsepower should be added. The weight of the machine is 25,300 lb.

The Exhibits Have Far Outgrown The Million Dollar Pier

Large additional structure required for display of Machinery—Motor transport tent erected between track exhibits



TWO years ago, in order to take care of the larger number of exhibitors it was necessary to reduce the amount of space formerly allotted to some of the older exhibitors and to build a small structure at the end of Arkansas avenue, across the Boardwalk from the Pier, to house a few of the heavy machinery exhibits. It became evident quite early this year that still more exhibit space would be required. The obvious solution of the problem was to remove all of the machine tool and heavy machinery exhibits from the Million Dollar Pier, which is not particularly well suited for that purpose, and build a new structure to be designated as Machinery Hall. This, it was thought, would ease off the crowded condition on the Pier and also provide for the new exhibitors who were clamoring for attention.

When the convention opens this morning, however, it will be found that the Million Dollar Pier is just as crowded as it was two years ago and that in addition all of the spaces in Machinery Hall, across the Boardwalk from the Pier, are filled. Incidentally, the providing of this new structure taxed the officers of the Railway Supply Manufacturers' Association to the very limit. When the matter was first considered and contracts let, a much smaller building was planned for. The demand for space grew so great that it was necessary to enlarge it to its present size, which includes 105 spaces.

After the arrangements for the enlarged exhibit space had been made another problem presented itself. The steam railroads have been showing an increasing interest in motor bus and truck transportation and there came an insistent demand from the manufacturers of such equipment and its accessories to be permitted to display their wares. The situation was an awkward one and for a while there seemed to be no practical way of meeting the demand. Finally, however, it was found that the space between the railroad sidings on Mississippi and Georgia avenues (a few minutes' walk to the south from the Million Dollar Pier and adjacent to the Boardwalk) could be cleared off and by utilizing it for a motor transport exhibit, would practically form, with the two track exhibits, a single unit. Experience with a somewhat similar exhibit at the American Electric Railway Association meeting last October, showed that a hard floor must be provided. The space included by the Motor Transport

Exhibit, therefore, even though it is under a tent, has a concrete floor and is adequately lighted. This space, 150 ft. by 180 ft., has been divided into 30 spaces of several sizes.

The following table shows the growth of the exhibit during the years when conventions have been held, since and including 1910:

Year	Exhibit space sq. ft.	Number of exhibits
1910	71,019	245
1911	76,110	262
1912	83,507	277
1913	87,360	266
1914	82,218	222
1915	70,412	258
1916	76,643	314
1919	93,499	365
1920	100,061 *	341
1922	96,000	373
1924	102,988	400
1926	145,600	

* Balcony used for exhibits in 1920. Practice discontinued in following years because of poor location.

List of Exhibitors

The following data concerning the exhibits shows the name of the exhibitor, the location of the main office of the company, the important features of the exhibit, the names of the representatives and the space or spaces occupied. All exhibit spaces under 800 are on the Million Dollar Pier, except those in the Motor Transport Exhibit, which are numbered 1 to 30, but are clearly designated as being in that exhibit. Spaces from 800 to 975, inclusive, are in Machinery Hall.

Adams & Westlake Company, Chicago.—Lighting fixtures; car hardware; basket racks; white metal washstands; brake handles; sheet metal and cast signal lamps. Represented by W. J. Pierson, A. S. Anderson, E. L. Langworthy, E. H. Stearns, A. B. Crampton, H. Scip and E. H. Leisch. Space 134.

Air Reduction Sales Company, New York.—Airco oxygen and acetylene; No. 1-A Radiograph; No. 2-A Oxygraph; Airco-Davis-Bournonville welding and cutting torches, pressure regulators, hose, welding rods and supplies; Airco-National carbide; Airco carbide railroad lamps. Represented by E. M. Sexton, B. N. Law, R. T. Peabody, W. H. Ludington, H. L. Rogers, T. M. Hamer, C. A. Daley, J. W. Hicok, C. F. Van Horn, G. Van Alstyne, W. W. Barnes, W. A. Crutcher, C. D'W. Gibson, J. N. Harkins, G. W. Irwin, P. W. Kromer, E. F. Lindgren, W. S. Schoenthaler, J. A. Shand, L. A. Sholes, J. S. Strate and J. A. Warfel. Spaces 639, 700, 701 and 703.

Ajax Manufacturing Company, Cleveland, O.—Working model of latest design of upsetting forging machine; sample forgings produced by Ajax forging machinery methods. Represented by J. R. Blakeslee, J. A. Murray and A. L. Guilford. Space 378.

Allegheny Steel Company, Breckenridge, Pa.—"ASCO" journal box lids, truck spring plates and dust guards; "ASCOLOY" chromium iron locomotive piston rods, locomotive side rods, kitchen utensils, seamless and lap weld tubes and miscellaneous articles. Represented by H. S. Brautigam, O. M. Otte and L. W. Hostettler. Spaces 553, and 938 and 940, Machinery Hall.

American Abrasive Metals Company, New York.—Anti-slip step treads for passenger cars; Anti-slip thresholds; Anti-slip floor plates. Represented by Austin B. Sayre, Ralph P. Spooner, Ellsworth Burger and Charles A. Cocks. Space 626.

American Arch Company, Inc., New York.—Security arches; flash pan brick lining for oil burning locomotives; electric signs showing firebox with arch and without arch. Represented by H. K. Slaybaugh, J. P. Neff, W. L. Allison, R. J. Himmelright, J. T. Anthony, G. A. Price, George Wagstaff, T. F. Kilcoyne, Thomas Hahar, W. E. Salisbury, T. M. Ferguson, W. W. Neale, W. R. Smith and A. M. Sucese. Spaces 412, 414, 416, 422 and 424.

American Brake Shoe & Foundry Company, New York.—A. R. A. standard patterns and special type brake shoes; improved combination locomotive driver brake head. Represented by W. S. McGowan, W. B. Given, F. W. Sargent, T. S. L. Seaman, M. N. Trainer, G. E. Anne, F. H. Coolidge, R. E. Holt, E. L. Janes, William Minto and J. T. Talbot. Space 418.

American Brown Boveri Electric Corporation, Camden, N. J.—Mercury arc power rectifier with auxiliaries; Brown Boveri individual axle drive for electric locomotives. Represented by C. L. Bardo, G. O. Hammond, L. N. Reed and Walter Giger. Space 221.

American Car and Foundry Company, New York.—Vertical electric reamer; Berwick electric rivet heater; forging heater; and miniature bar heater. Represented by J. H. Weisbrod, F. C. Cheston, R. J. Smith, W. A. Williams, C. D. Terrell and J. B. Herman. Spaces 2 and 974 and 979, Machinery Hall.

American Malleable Castings Association, Cleveland, O.—Malleable iron castings used in freight car construction and truck and bus equipment; physical tests of malleable iron castings to demonstrate their fitness for railway and automotive use. Represented by Enrique Touceda and Robert E. Belt. Spaces 928 and 930, Machinery Hall.

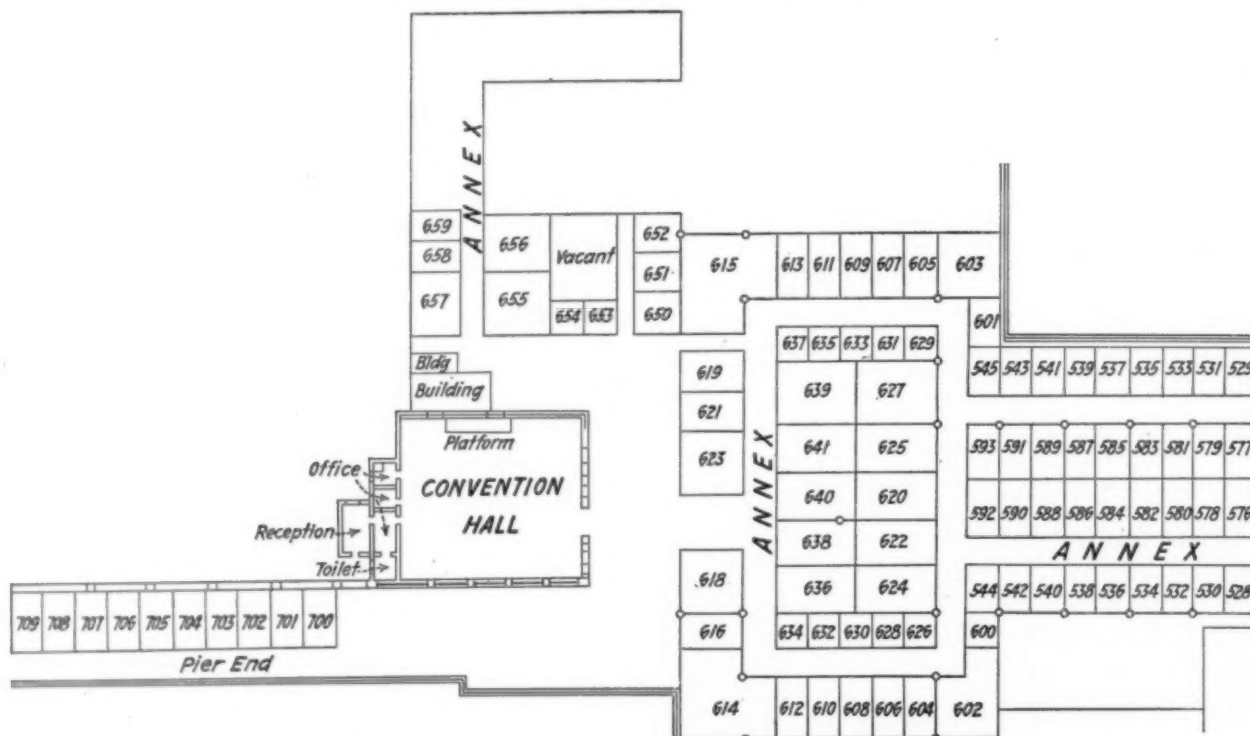
American Mason Safety Tread Company, Lowell, Mass.—Standwood car steps; Karbolith composition car flooring; Mason safety treads; Non-Slip ladder shoes; rolled steel thresholds; extruded brass thresholds; aluminum and brass nosings; linoleum; cork carpet. Represented by H. A. Welcome and E. W. Wyman. Space "F," Front Porch.

American Railway Appliances Company, Inc., New York.—Superior locomotive flue blower. Represented by August Schneider, Frank J. Whelan and Lloyd D. Brown. Space 406.

American Steel Foundries, Chicago.—Bolsters; brake beams; couplers; miscellaneous steel castings; side frames; springs; steel wheels. Represented by G. E. Scott, R. H. Ripley, W. J. Lynch, J. V. Bell, F. B. Ernst, George G. Floyd, W. R. Gravener, C. L. Heater, T. H. Hopkirk, L. E. Jones, P. A. Martin, R. W. McKisson, A. W. MacLaren, A. H. Peyche, C. B. Pierce, H. D. Richardson, T. R. Sadler, G. F. Slaughter, S. W. Sargent, W. S. Spieth, W. S. Stearns, W. G. Wallace and J. E. Wright. Spaces 149 and 151.

American Throttle Company, Inc., New York.—Multiple throttle with a superheater header. Represented by F. A. Schaff, G. E. Ryder, R. M. Ostermann, R. R. Porterfield and Bard Browne. Space 424.

American Tool Works Company, The, Cincinnati, O.—6-ft. and 3-ft. triple purpose plain radial drills; 24-in. by 12-ft. heavy pattern high duty lathe; 14-in. by 8-ft. high duty lathe; 3-ft. high speed sensitive radial drill; 24-in. heavy service back geared crank shaper. Represented by J. C. Hussey, H. W. Schatz, L. W. S. Alter and F. L. Stubenroth. Spaces 800, 802, 804, 806 and 808, Machinery Hall.



Arrangement of Exhibit Spaces at Outer or Convention Hall End of Million Dollar Pier

American Car & Foundry Motors Company, New York.—Fageol safety coaches; models of parlor car type and street car type; Hall-Scott six-cylinder motor coach engine. Represented by W. L. Stancliffe, J. Allan Smith, Gordon Lee, W. J. Ostrander, F. S. Beasecker, Charles C. Castle and Carl Abel. Spaces 8 and 10, Motor Transport Exhibit.

American Engineering Company, Philadelphia, Pa.—"Lo-Hed" Class "A" one-ton electric hoist; Class "B" two-ton electric hoist (hand geared); Class "H" four-ton electric hoist (motor trolley); Class "H" three-ton electric hoist. Represented by A. E. Martell and H. Kempner. Spaces 202, 204 and 206.

American Hoist & Derrick Company, St. Paul, Minn.—Model "B" type rivet heater for use on structural work; model "C" type, boiler shop rivet heater. Represented by W. K. Garvin and P. J. Kiwus. Space 964, Machinery Hall.

American Locomotive Company, New York.—Two three-cylinder locomotives; oil-electric locomotive; Alco reverse gear; Alco staybolts; Pitkin staybolts. Represented by J. B. Ennis, D. W. Fraser, L. S. Carroll, D. Van Alstyne, J. G. Blunt, C. M. Muchnic, A. Hamilton, E. C. Fisher, O. Parsons, R. Anderson, F. H. Reynolds, G. G. Jones, J. R. Magarvey, J. H. Link, W. Farrell, O. R. Hale, R. McGoll, J. Partington, R. P. Allison, G. Gurry, H. Swayer, H. C. Butler, E. N. Boswell, J. Kindevater, S. Miller, G. Weiler, G. P. Robinson, A. F. Pitkin, C. Bell, A. I. Lipetz, R. F. Williams, D. Williams, C. H. Apps, A. Haller, J. H. Downes, E. H. Dickinson, E. Sheffield, C. T. Markel, D. D. Cooke, E. B. Rouse, E. Duchesne and A. W. Bruce. Space 614 and Track Exhibit.

Ames Shovel & Tool Company, Boston, Mass.—Railway track shovels and scoops. Represented by Alfred C. Howell, V. S. Yarnall, Edwin T. Nipher and Frederick H. Levis. Space 355.

Anchor Packing Company, The, Philadelphia, Pa.—Packings; asbestos products; mechanical rubber goods. Represented by W. R. Haggart, D. J. P. Murray, A. G. Benson, J. P. Landreth and B. J. Miller. Space 87.

Anchor Post Iron Works, New York.—Chain link fence; intertrack fence; right-of-way fence posts; steel warehouse trucks. Represented by E. F. Waller, H. G. Thomson, A. Blaesser and J. G. Mayer. Space 133.

Andrix Lock Nut Company, Inc., Adrian, Mich.—Lock nuts and wrenches. Represented by Harry Andrix, Fred R. Fogle and Joseph A. Reck. Space 163.

Ashton Valve Company, The, Boston, Mass.—Locomotive muffled and open pop safety valves; standard locomotive steam and air gages; quadruplex air brake gages; double illuminated dial locomotive steam gages; steam chest and back pressure gages; wheel press recording gages; weight gage testers; locomotive driving wheel quaterning gages; protected dial gages. Represented by J. F. Gettrust, H. O. Fettinger, H. J. Tierney and J. W. Motherwell. Space 518.

Association of Manufacturers of Chilled Car Wheels, Chicago.—Chilled iron car wheels. Represented by G. E. Duke and D. F. Hoy, Jr. Space 140.

Atkins & Co., E. C., Indianapolis, Ind.—All kinds of hand, rip and panel saws; Pullman car saws; metal cutting saws; hack saw blades and frames;

grinding machines; machine knives; metal cutting machinery; cross cut saws; handles; circular and band saws. Represented by E. S. Norvell and John Hartsook. Spaces 968 and 970, Machinery Hall.

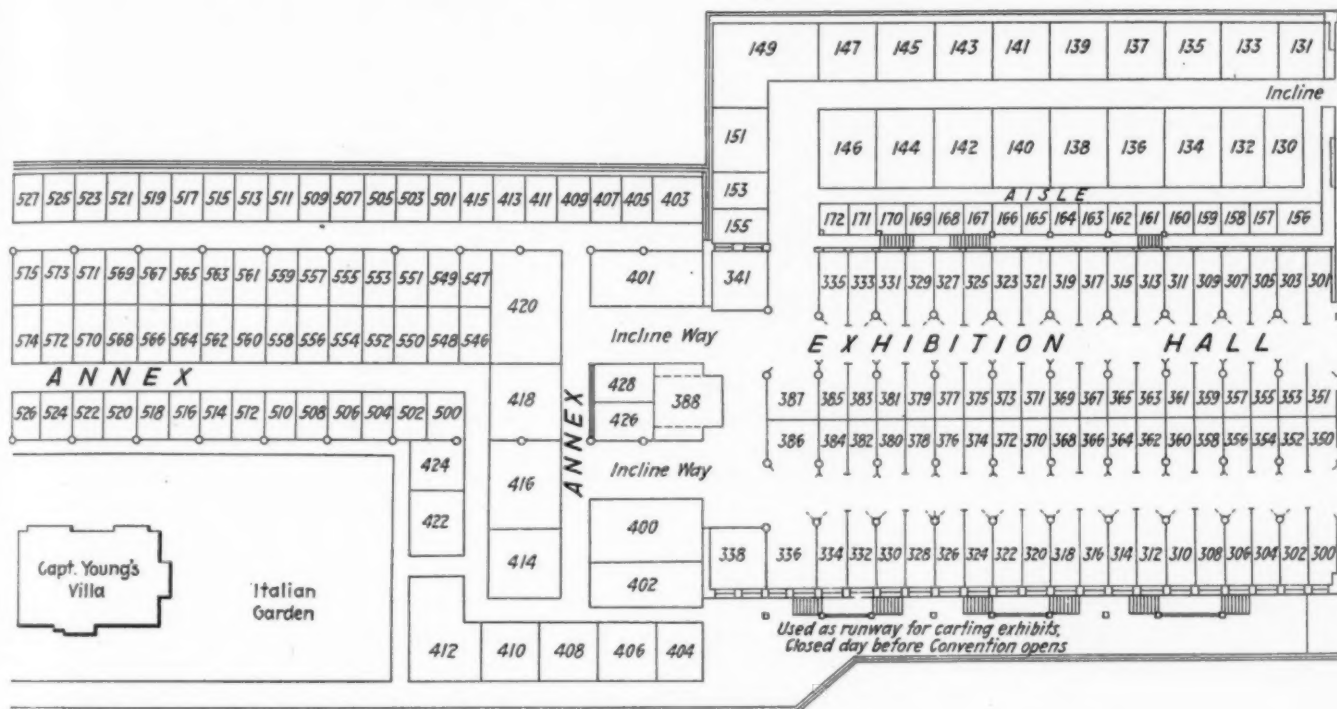
Atlas Steel Corporation, Dunkirk, N. Y.—Tool steel and special alloy steel products, including hot rolled rounds, squares, octagons, hexagons, flats and special shapes; cold drawn carbon and high speed drill rods; special shapes and sizes of bar stock; drop forgings; high speed cutter blanks; railroad tire turning tools and special forgings; Attractoscope showing views of plant and operations. Represented by F. P. Case, G. Peterson and W. W. Wills. Space 362.

Automatic Transportation Company, Inc., Buffalo, N. Y.—“Automatic” type CEA locomotive crane truck, type LA elevating platform truck, type TLA tiering lifting truck, and type TA three-wheel tractor. Represented by R. J. Mulholland. Spaces 301, 303 and 305.

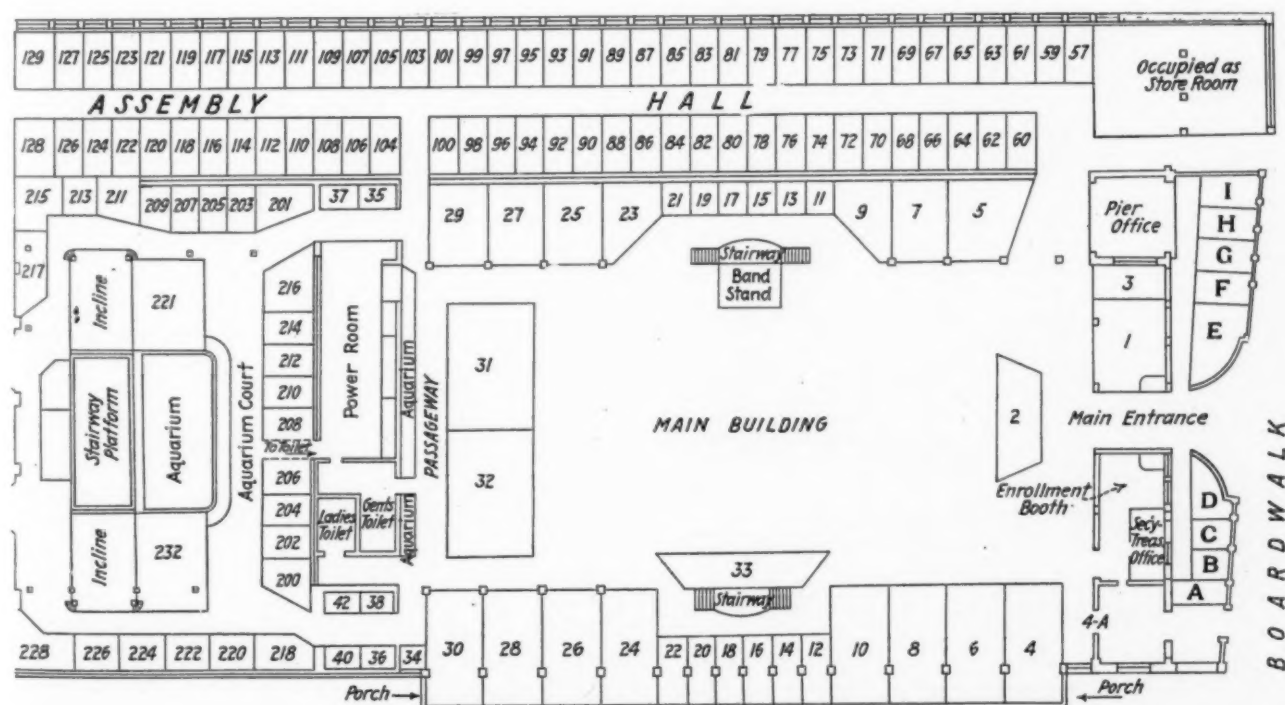
B & S Manufacturing Corporation, Hoboken, N. J.—Automatic drifting valve; cylinder cock. Represented by H. O. Wittpenn, R. W. Braden and C. Stern. Space 360.

Badeker Manufacturing Company, Chicago.—Badeker metallic packing; Badeker quick renew hub liner; arch tube plug; shaker bar latch; grease cup bushing. Represented by E. V. Lea and J. P. McKinley. Space 88.

Baker-Raulang Company, Cleveland, O.—Baker locomotive type crane; Hy-Lift truck; tractor. Baker-Raulang bus body, parlor chair type with luggage rack, on White chassis. Represented by C. D. Gilpin, Nathaniel Platt, DePeyster Stagg, H. B. Greig, F. N. Phelps, M. A. Watterson, E. J. Bartlett, W. F. Hebard, E. J. Stahl, E. T. Pearsons and Hugh Seeley. Spaces 336, and 15, Motor Transport Exhibit.



Arrangement of Exhibit Spaces in Central Portion of Million Dollar Pier



Arrangement of Exhibit Spaces at the Boardwalk End of the Million Dollar Pier

Baldwin Locomotive Works, The, Philadelphia, Pa.—Three-cylinder compound locomotive, 4-10-2 type, with water-tube firebox; D. & R. G. W. three-cylinder, 4-8-2 type locomotive. Reception booth. Represented by G. Greenough, A. H. Ehle, S. McNaughton, Charles Riddell, A. J. Beuter, A. S. Goble, and W. B. Keys. Space 625 and on track.

Ball Railway Time Service, The, Chicago.—Railroad standard watches and clocks for railroad service. Represented by S. Y. Ball, L. L. Doty, J. H. Barkemeyer and J. W. Dodge, Jr. Space 659.

Barco Manufacturing Company, Chicago, Ill.—Barco all-metal connections for air, steam, oil and water between locomotive and tender and for oil and lubricating pipes between high and low pressure units on Mallet locomotives; Barco all-metal steam heat connections for rear of tender and between passenger cars; Barco flexible joints between air reservoirs and other auxiliary devices and piping; Barco flexible joints for roundhouses, shops, yards, stations, etc.; Barco automatic smokebox blower fitting; Barco lubricated plug valves; Barco power reverse gear. Represented by C. L. Mellor, F. H. Stiles, A. S. Lewis, W. J. Behlke, C. O. Jenista and F. B. Nugent. Space 641.

Bassick Manufacturing Company, Chicago.—Locomotive lubricating equipment; side rod and valve lubrication, and signal equipment. Represented by C. A. Fine, C. W. Hazzard and H. J. Karow. Space 93.

Bath & Co., John, Worcester, Mass.—Ground taps; ground thread gages; ground thread rolling dies; special ground hobs; Bath internal micrometer and master reference ring; samples of work showing how tapping problems were overcome. Represented by John Bath, J. Chester Bath, Stanley W. Bath and Robert E. Lamb. Space 83.

Bearium Bearings, Inc., Buffalo, N. Y.—Railway brasses. Represented by F. A. Robertson, W. H. Judy, A. A. Matthews. Space 169.

Besly & Co., Charles H., Chicago, Ill.—Besly taps; Besly titan abrasive discs. Represented by R. E. Beimer and C. A. Knill. Space 91.

Doering, J. C. Keene, G. L. Kilmer, B. C. Kilkerson, A. F. Steubing, T. E. Rodman and E. L. Nusz. Spaces 554 and 555.

Bradley Washfountain Company, Milwaukee, Wis.—54-in. Bradley washfountain to accommodate 10 persons, with automatic foot control water supply. Represented by W. H. Silpath, Joseph F. Leonard and A. Hicks. Space 330.

Bragg-Kliesrath Corporation, Long Island City, N. Y.—Demonstration of B-K vacuum booster brakes. Represented by C. S. Bragg, V. W. Kliesrath and P. V. Clodio. Space 156.

Brewster, Inc., Morris B., Chicago.—Brewster metallic packing; Brewster washout plugs; James driving box. Represented by Morris B. Brewster and John Ash. Space 612.

Bridgeport Safety Emery Wheel Company, Bridgeport, Conn.—86 in. heavy duty guide bar grinder; No. 6 motor driven floor grinder; sectional grinding wheel. Represented by H. H. Peck, D. T. Homan, I. L. Burritt and H. E. Smith. Spaces 819 and 821, Machinery Hall.

Brill Company, The J. G., Philadelphia, Pa.—Brill 27-MCB-3 motor truck for gas-electric cars; illuminated transparencies of self-propelled cars. On track: 250-hp. gas-electric car, 73 ft. long; 250-hp. gas-electric car, 60-ft. long; model 75 gas rail car and trailer. Represented by C. J. McPherson, A. H. Hudson, A. F. McCormick, A. W. Holbrook, E. T. Bronenkamp, F. A. Keihn and T. K. Thompson. Spaces 103 and 105, and on track.

Brown-Lipe Gear Company, Syracuse, N. Y.—Model 60 3-UPP transmission for heavy duty bus service; model 55 4-UPP transmission for bus service; model 70 7-M. F. transmission for heavy duty truck service; 16 in. single plate clutch for heavy duty bus service; 14 in. single plate clutch for bus service. Represented by J. O. Pierce, E. S. Nottingham, R. V. Hessler,



Arrangement of Exhibit Spaces in Machinery Hall, Across the Boardwalk from the Million Dollar Pier

Bethlehem Steel Company, Bethlehem, Pa.—Four-wheel Bethlehem auxiliary locomotive; six-wheel Bethlehem auxiliary locomotive; charcoal iron; boiler tubes; rolled steel wheels, including a single life wheel; new rolled steel wheel for motor trucks and buses, using pneumatic tires. Represented by G. W. Struble, David Newhall, R. S. Folk, F. M. Morley, J. R. Stuart, R. J. McCarty, I. C. Jordan, J. P. Desmond, R. C. Wolfe, M. H. Burke, H. G. Walton, Herbert Smiley, C. S. Watson, George Raab, Edward Jones, J. C. Tobias, George A. Richardson and S. H. Yorks. Spaces 108 to 120, inclusive.

Bettendorf Company, The, Bettendorf, Iowa.—Complete Bettendorf truck, 5½ in. by 10 in.; complete Chiles type Bettendorf truck, 5½ in. by 10 in.; various brake hanger attachments; Pin-less journal box dies. Represented by J. W. Bettendorf, J. H. Bendixen, E. J. Bettendorf, W. E. Bettendorf, C. J. W. Clasen, F. K. Shults, K. M. Hamilton, P. P. Beck, F. W. Lewis and John Brady. Spaces 218 and 220.

Bird-Archer Company, The, New York.—Boiler chemicals; blow-off cocks. Represented by P. Bowman Bird, W. E. Ridenour, L. F. Wilson, J. A. McFarland, C. A. Bird, H. C. Harragin, T. A. Peacock, J. C. Hutton and H. P. Mauer. Space 31.

Blackall, Robert H., New York, N. Y.—Lawson pipe wrenches. Represented by R. H. Blackall and H. F. Thorne. Space 544.

Blacker Engineering Company, New York.—Special type of forging hammer. Represented by A. B. Drullard, William Blacker and James Norris. Space 879, Machinery Hall.

Black & Decker Manufacturing Company, The, Towson, Md.—Heavy duty grinders; snappers; buffers; swing grinders; portable electric drills; electric screw drivers, socket wrenches, tappers and reamers. Represented by R. D. Black, W. A. Marschke, G. M. Buchanan, R. E. Mizener, C. A. Stiles, L. M. Boyd, B. A. Brown, R. R. Herrick and H. B. Austin. Spaces 971, 973 and 975, Machinery Hall.

Boss Bolt & Nut Works, Chicago.—Boss Lock Nuts; Bolts and Rivets. Represented by A. W. MacLean, W. G. Willcoxson and F. W. Edmunds. Space 312.

Bosch Magneto Company, Inc., Robert, New York.—Demonstration of voltage-regulated bus generator furnishing lighting current to batteries; complete bus lighting installation; magnetos; generators; horns; headlights; spotlights for motor bus use. Represented by A. J. Poole and J. T. Lansing. Space 166.

Bowser & Co., Inc., S. F., Fort Wayne, Ind.—Oil and gasoline handling equipment for storehouse, shop and wayside points; special gasoline pump for serving fuel to gasoline and gas-electric cars and motor buses. Represented by W. E. Frasier, Jr., H. B. Pfisterer, P. E. Krider and T. D. Kingsley. Space 28.

Bradford Corporation, The, New York.—Bradford rocker type draft gear; Bradford type L draft gear; Huntoon truck bolsters; high capacity helical truck springs; Huntoon brake beams; truss rod brake beams; Chambers front end throttle valve; Bradford front end throttle valve. Represented by Horace Parker, Burton Mudge, F. K. Mays, H. F. Lowman, W. C.

E. A. Brown, W. R. Coughtry, H. W. Sweet, G. A. Carhart, A. E. Parsons and C. S. Space. Space 314.

Brubaker & Brothers Company, W. L., Millersburg, Pa.—Taps; reamers; dies; screwplates. Represented by H. B. Morrison, O. R. Kusler, W. Searls Rose and J. A. W. Brubaker. Space 543.

Buckeye Portable Tool Company, The, Dayton, O.—Air drills; reamers; grinders; buffers; sanders; screw drivers; nut tighteners. Represented by W. W. Price, W. R. Gummere, C. W. Ripsch, H. O. Gummere, G. A. Barden, W. A. Lueckel, M. W. Scott and J. R. Swift. Space 358.

Buckeye Steel Castings Company, The, Columbus, O.—Buckeye yoke attachment assembled with A.R.A. center sill construction with integral back stop and integral striking and front lug and carrier casting; A.R.A. standard "D" coupler; cast steel bolsters and side frames of all types; 120-ton capacity six-wheel truck model; freight car castings. Represented by J. G. Bower, S. P. Bush, F. J. Cooledge, M. R. Hansen, G. T. Johnson, J. C. Larsen, G. A. MacPherson, W. W. Matchner, M. S. Simpson, H. W. Stertzbach, A. H. Thomas, J. C. Whitridge and H. H. Wolfe. Spaces 603 and 605.

Buffalo Brake Beam Company, New York.—Brake beams and brake beam parts; brake beam fourth-point supports with guards; brake beam auxiliary supports; self-locking brake pins; brake shoe safety keys; draft key locks. Represented by S. A. Crone, A. E. Crone, E. C. Farlow, C. R. Busch, E. F. Gladwell, A. Gordon Jones, J. L. Logan, C. B. Porter and E. Strassburger. Spaces 550 and 551.

Buffalo Forge Company, Buffalo, N. Y.—Bar cutters; combination punch, shear and bar cutters; bending rolls; forges; drills; blowers. Represented by H. W. Wendt, Jr., E. G. Leonard, G. H. Zimmer and A. T. Yates. Spaces 825, 827 and 829, Machinery Hall.

Bullard Machine Tool Company, Bridgeport, Conn.—54-in. vertical turret lathe; 24-in. vertical turret lathe; new type turret locking device. Represented by J. W. Bray, E. P. Blanchard, F. S. Lincoln, J. M. Welch and F. E. Hatch, Jr. Spaces 856, 858 and 860, Machinery Hall.

Burden Iron Company, The, Troy, N. Y.—Staybolt iron; engine bolt iron; iron boiler rivets; hollow drilled staybolts. Represented by John C. Kuhns. Space 540.

Byers Company, A. M., Pittsburgh, Pa.—Wrought iron pipe. Represented by J. H. Ainsworth, F. W. Stubbs, C. A. Croft and C. W. Damberg. Space 578.

Camden Forge Company, Camden, N. J.—Wrought iron and steel forgings. Represented by J. H. Higgins and W. S. Cox. Space 125.

Camel Company, Chicago.—Freight car doors and fixtures. Represented by W. W. Darrow, H. E. Creer, T. H. Goodnow, F. C. Heinen, C. E. Eklind and K. J. Tobin. Spaces 528, 530 and 532.

Carbo-Oxygen Company, Pittsburgh, Pa.—Cutting apparatus; welding apparatus; welding apparatus; carbo-hydrogen gas; carbo-oxygen gas. Represented by C. C. Trees and F. A. Wirth. Space D, Porch.

Carborundum Company, The, Niagara Falls, N. Y.—Carborundum portable sanding machine and other abrasives. Represented by J. H. Jackson, J. W. Fraser, S. Odoran, S. F. Courter and John MacArthur. Space 78.

Carlton Machine Tool Company, Cincinnati, O.—Two radial drilling machines. Represented by Jack C. Carlton and Harry J. Westmeyer. Space 951, Machinery Hall.

Carnegie Steel Company, Pittsburgh, Pa.—New Carnegie light weight freight car wheels; wrought steel wheels for freight and passenger service; axles; section of fabricated center sill; structural, bar and rail products; photographs showing manufacture of wheels and rails. Represented by W. G. Clyde, C. L. Wood, John E. Woods, J. C. Shields, C. C. Cluff, L. C. Bibler, Harry W. Summers, J. F. Miller, R. E. Maxwell, R. W. Steigerwalt, J. A. Ralston, Charles Orchard, R. L. Twitchell and G. R. Schreiner. Space 420, and on Mississippi av. track exhibit.

Carr Fastener Company.—See "Dot Lubricator Division, Carr Fastener Company."

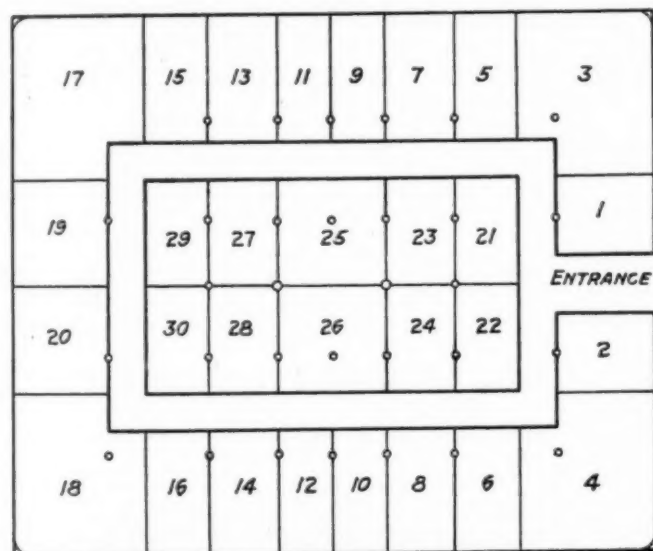
Central Steel Company, The, Massillon, O.—Alloy steel staybolts; boiler tubes; engine bolts. Represented by J. M. Schlendorf, D. B. Carson, I. H. Jones and A. S. Taylor. Space 201.

Centrifex Corporation, Cleveland, O.—Centrifugal fixtures for the purification of steam in locomotives and stationary boilers; device for application on compressor intakes for the removal of dust and excess moisture; different types of centrifugal units for the removal of oil and water from compressed air lines. Represented by C. G. Hawley, J. A. Boyden and L. C. Kerner. Space 363.

Celotex Company, The, Chicago.—Celotex car insulation; illustrations showing methods of using. Represented by C. E. Stedman, J. H. Bracken, J. H. Thomas and G. R. McVay. Space 634.

Chase & Co., L. C., Boston, Mass.—Chase Velmo; Chase mohair car plushes; Chase Leatherwove. Represented by H. T. Wight, B. E. Sawyer and C. R. Warren. Space 10.

Chaton Fibre Company, Boston, Mass.—Chaton all-fibre standard dust guard; Chaton all-fibre adjusting dust guard; "Dustite" cover boxes. Represented by Edwin C. Cotton and S. W. Midgley. Space 36.



Arrangement of Exhibit Spaces in the Motor Truck and Bus Tent. This Lies Between the Track Exhibits Two Blocks South of the Million Dollar Pier

Chicago-Cleveland Car Roofing Company, Chicago.—Chicago-Cleveland flexible all-steel roof; Viking all-steel roof; National flexible outside metal roof; Superior outside metal roof; Winslow inside metal roof; Atlas vertical corrugated steel end; Viking hopper door; Reliable uncoupling device; Relco uncoupling device; E. Z. Fit uncoupling device. Represented by C. D. Jenks, J. L. Stark and E. H. Mattingley. Spaces 590 and 591.

Chicago Pneumatic Tool Company, New York.—Pneumatic tools; electric tools. Represented by H. A. Jackson, A. E. Goodhue, H. G. Barbee, J. L. Rowe, E. K. Lynch, H. R. Deubel, F. R. Liggett, G. G. Porter, D. E. Cooke and A. C. Andresen. Space 623.

Chicago Railway Equipment Company, Chicago.—Brake beams; brake beam supports and safety devices; brake beam safety guards; bottom connection safety guards; side bearings; ball bearing car doors. Represented by E. B. Leigh, A. C. Moore, F. T. DeLong, G. N. Van Swerigen, E. G. Busse, R. J. Sheridan, F. R. Carlson, H. M. Van Swerigen, E. F. Jager, E. E. Grist and E. A. LeBeau. Spaces 640 and 147.

Cisco Machine Tool Company, The, Cincinnati, O.—16-in. Cisco motor in base of tool room lathe; 24-in. heavy duty geared head headstock; thread milling attachment; oil grooving attachment. Represented by H. S. Hammond and H. Kienker. Space 959, Machinery Hall.

Clark Car Company, Pittsburgh, Pa.—Air-operated balanced door dump car (type G-6 extension side dump). Represented by Charles H. Clark, Arthur H. White, H. G. Doran, J. C. Little, F. A. Barbey, F. C. Dankmyer and R. M. Mitchell. Space 79 and track exhibit on Mississippi Avenue.

Clark Manufacturing Company, The, Philadelphia, Pa.—Smith Multiplex pressure jacks. Represented by W. B. Clark, H. J. Smith and J. D. Burnham. Space 361.

Cleveland Pneumatic Tool Company, Cleveland, O.—Ball bearing air drills; pocket-in-head riveting hammers; chipping, calking and beading hammers; corner drills; compound drills; Bowes automatic air hose couplings; pressure seated air valves; Gruss shock absorbers for the automobile trade. Represented by H. S. Covey, L. W. Greve, Arthur Scott, R. B. Van Norman, J. A. Dockery, R. H. Rockefeller, B. H. Tripp, C. J. Albert and F. H. Burr. Spaces 331, 333 and 335.

Cleveland Twist Drill Company, The, Cleveland, O.—Cle-Forge high speed drills; Peerless high speed reamers; Mezzo super-carbon drills; various types of "Cleveland" drills and reamers. Represented by Harley G. Smith, Oliver B. Hansen, R. G. Berrington, H. S. White, A. J. Ireland, F. M. Hoelzle, F. A. Kelly, D. D. Burdett, T. M. Skove, H. J. Baier, J. H. Dillard and W. E. Caldwell. Spaces 920, 922, 924 and 926, Machinery Hall.

Coffin, Jr. Company, The, J. S., Jersey City, N. J.—Coffin feedwater heater system; C-S truck. Represented by J. S. Coffin, Jr., Robert P. Peckett, Jr., E. L. Schellens and C. A. Schellens. Space 80.

Commonwealth Steel Company, Granite City, Ill.—Models of cast steel Delta trailer truck, cast steel pilot and pilot beam, cast steel engine bed assembled with pilot, pilot beam, engine trucks, cradle, trailer truck and ash pan. Model of cast steel four-wheel engine truck; models of tender frames mounted on four-wheel and six-wheel trucks. Models of cast steel platforms and end frames for passenger cars; cast steel four-wheel truck for express-refrigerator cars; six-wheel truck, bottom equalizer type; six-wheel truck, straight equalizer type; four-wheel truck for electric cars. Represented by George E. Howard, B. V. H. Johnson, C. S. Shallenberger, George H. Gibson, H. R. Bartell, W. M. Sheehan and C. P. Whitehead. Spaces 386 and 387.

Consolidated Machine Tool Corporation of America, Rochester, N. Y.—Newton 32-in. crank planer with rail and side head; Betts two-carriage combination journal truing and axle lathe; Colburn 48-in. heavy duty boring mill; Colburn D-4 heavy duty drill press. Represented by R. G. Holmes, A. W. Van Buren, H. M. Bowman, O. S. Anderson, A. H. Ingle, H. L. Boecler and Alfred Trosch. Spaces 848, 850, 852 and 854, Machinery Hall.

Crane Company, Chicago.—Valves and fittings for locomotives, cars and power plants. Represented by J. B. Jordan, F. W. Venton, J. C. Cole, M. Baxter and G. E. Barker. Spaces 506 and 508.

Cresson Morris Company, Philadelphia, Pa.—Electric woodworking machinery. Represented by N. P. Wartman, Jr., C. E. Peterson and P. H. Morris, Jr. Space 978, Machinery Hall.

Crowe Manufacturing Corporation, The, Cincinnati, O.—Three sizes of Crowe safety saws. Represented by J. M. Crowe, James E. Stewart, M. W. Scott, C. E. Murphy, J. B. Corby, J. T. Hatfield, J. D. Crigler, C. W. Simrall, E. C. Peebles and E. M. Kohler. Space 515.

Curtain Supply Company, The, Elkhart, Ind.—Car curtains; vestibule diaphragms; vestibule curtain equipment; Rex metal sash; Rex weatherstrip. Represented by G. B. Allison, Ralph Brown, T. W. Heaton, T. W. Holt, John Levan, T. P. Brian and E. E. Whitmore. Space 638.

Davis Boring Tool Company, St. Louis, Mo.—Expansion car wheel boring tools; expansion reamers; expansion boring tools for general railroad shops; cutter grinding machine; expanding blocks; cutters. Represented by E. E. Davis, W. E. Moberly and R. T. Monahan. Space 209.

Davis Brake Beam Company, Johnstown, Pa.—Brake beams; brake beam supports; pressed steel journal box lids; metal stampings. Represented by H. E. Pasmore, C. F. Perkins, C. K. Stillwagon and G. W. Fox. Spaces 546 and 548.

Dayton Pneumatic Tool Company, The, Dayton, O.—Pneumatic chipping and riveting hammers; rammers, "Bull Dog" safety nail driver. Represented by L. B. George, J. H. Hobstetter and E. C. Thompson. Space 324.

Dearborn Chemical Company, Chicago.—Dearborn scientific water treating preparations for prevention of scale, corrosion and foaming in steam boilers; No-Ox-Id rust preventive for use on all-metal equipment. Represented by Robert F. Carr, George R. Carr, Grant W. Spear, W. H. Kinney, J. D. Purcell, E. M. Hoffman, C. S. Murray, L. P. Bowen and H. J. Cornell. Spaces 6 and 8.

De Laval Separator Company, The, New York.—No. 300 De Laval crank-case oil reclaiming outfit; 26-in. waste reclaiming extractor. Represented by W. D. Cleary, A. J. Marron, Robert Kostelak and M. A. Monroe. Spaces 99 and 101.

Detroit Lubricator Company, Detroit, Mich.—Detroit Bullseye locomotive lubricators; automatic flange oilers; model A locomotive force feed oiler; transfer filler. Represented by A. G. Machesney, C. L. Butler and S. A. Witt. Spaces 203 and 205.

Detroit Seamless Steel Tubes Company, Detroit, Mich.—Locomotive body flues; superheater tubes; arch tubes; stationary boiler tubes; mechanical tubing. Represented by H. E. Ross, H. C. Kensing, L. R. Phillips, C. H. Hobbs and John W. Hubbard. Space 315.

Diamond Machine Company, Providence, R. I.—36-in. by 108-in. heavy face grinding machine; 14-in. portable motor driven ball bearing grinding machine; 18-in. motor driven floor grinding machine. Represented by A. A. Wood, M. Slepokow, L. H. Burrill and D. K. Bartlett. Spaces 952, 954 and 956, Machinery Hall.

Disston & Sons, Inc., Henry, Philadelphia, Pa.—Metal cutting circular and band saws; metal cutting circular and band saw machines in operation; hack saws; files; tool steel. Represented by S. Horace Disston, D. W. Jenkins, Cliff Forrest, Joe Dorrington, Edward Ludy and H. A. Baxter. Space 141.

Distance Speed Recording Company, New York.—Speed recorders; cut-off indicators and recorders. Represented by J. E. Matthews and H. A. Varney. Space 610.

Dixon Crucible Company, Joseph, Jersey City, N. J.—Solid belt dressing; lubricating graphite; motor brushes; boiler graphite; cup grease; stove polish; waterproof grease; pipe joint compound; hub liner grease; engine front finishes; brake cylinder lubricant; spring oil and rust solvent; triple

- valve graphite; graphite lubricating sticks; graphite paints; foundry facings; crucibles; lumber crayons. Represented by D. Thurston, J. M. Willits, O. D. Shonnard, P. H. Griffin, E. C. Bleam, J. J. Tucker and W. A. Housten. Space 24.
- Dot Lubricator Division, Carr Fastener Company, Cambridge, Mass.—"Dot" lubricating systems for steam and electric locomotives, particularly valve motion, hub liner, generators and stokers; also for buses, trucks and material handling equipment used on railroads; Crisman plate fitted with the "Dot" lubricator. Represented by P. K. Niven, C. L. Hall, L. H. Hein and Harold A. Ball. Space 310.
- Dressel Railway Lamp & Signal Company, Arlington, N. J.—Headlights; switch, marker and classification lamps; crossing signals and approach signals. Represented by A. D. Hobbie, F. W. Dressel, J. C. Wylie and H. S. Hoskinson. Spaces 631 and 633.
- Dromgold & Glenn, Chicago.—D & G threadless washout plug; D & G refrigerator car cleanout system; D & G refrigerator door post pocket; Pries hand drop brake; car and locomotive forgings. Represented by L. S. Dromgold and H. A. Glenn. Space 127.
- Duff Manufacturing Company, The, Pittsburgh, Pa.—Duff governor controlled self-lowering jacks; Duff pinion puller; high speed ball bearing screw jacks for car and locomotive work; journal box jacks; single acting genuine Barrett automatic lowering jacks; Duff horizontal jacks; Duff push and pull jacks. Represented by T. A. McGinley, P. G. O'Hara, C. N. Thulin, E. M. Webb, E. A. Johnson, G. E. Anderson and William Robb. Space 401.
- Dunn Company, W. C., Cincinnati, O.—Portable journal truing machine with air and electric drives. Represented by W. C. Dunn and J. W. Dunn. Space 115.
- Du Pont de Nemours & Co., Inc., E. I., Wilmington, Del.—Miniature locomotive finished with Duco; panels showing Duco finishes for railroad equipment; paint and varnish panels. Represented by A. E. Pratt, C. A. Lynn, F. H. Crawford, P. G. Kennett. Space 338.
- Edgewater Steel Company, Pittsburgh, Pa.—Locomotive tires; rolled steel wheels; draft gears; ring springs. Represented by W. V. D. Wright, J. H. Bailly, D. W. McGeorge, O. R. Wikander and J. H. Perry, Jr. Spaces 588 and 589.
- Edison Storage Battery Company, Orange, N. J.—Edison steel alkaline storage batteries. Represented by G. E. Stringfellow, D. C. Wilson, D. B. Mogan, W. F. Bauer and J. L. Hays. Space 636.
- Edna Brass Manufacturing Company, Cincinnati, O.—Injectors; hydro-static lubricators; mechanical force-feed lubricators; water columns; boiler checks; water gages; guide oil cups; engine castings. Represented by B. I. Kaufman, D. B. Joseph, R. B. Buram, William Beck, C. B. Randall, F. S. Wilcoxon and E. O. Corey. Space 129.
- Edson Manufacturing Corporation, Boston, Mass.—Edson diaphragm pumps of several varieties; complete line of auxiliary equipment. Represented by L. O. Arringdale. Spaces 566 and 567.
- Edwards Company, Inc., The, O. M., Syracuse, N. Y.—Window fixtures; extension platform trap doors; sash balances; weatherstripping; metal stop casings and parting stops; brass sash. Represented by O. M. Edwards, Harold Edwards, J. J. Edwards, E. F. Chaffee, A. J. Horgan, C. H. Rockwell and F. W. Chaffee. Spaces 527 and 529.
- Electric Arc Cutting & Welding Company, Newark, N. J.—"Alternarc" welding machines; "Alternarc" cutting machines; "Alternarc" rivet and car scrap cutter; "Dualarc" a.c.-d.c. welding generator; "Dualarc" gas engine welding machines; "Newarc" electrodes; "Newarc" accessories. Represented by C. J. Holslag, R. C. Miller and J. E. Gunning. Space 37.
- Electro-Motive Company, Cleveland, O.—Gas-electric motor car. Space, Mississippi Av. track exhibit.
- Electric Products Company, The, Cleveland, O.—Battery charging motor-generators and switchboards. Represented by Charles L. Leaf, Maxwell R. Berry and Harry R. Bungay. Space 160.
- Electric Service Supplies Company, Philadelphia, Pa.—Locomotive Headlights; switches, turbo-generators; headlights; motor bus headlights. Represented by C. J. Mayer, A. H. Englund, J. W. Porter, J. B. Miller, T. W. Childs, H. J. Graham, V. C. Pope, I. W. Schmidt, B. D. Barger, J. F. Carper, C. W. Berg, L. A. Darling, H. D. Rohman, W. L. Kirk, J. R. McFarlin, T. F. McKenna, W. H. Smaw, E. B. Hallman, L. T. Barry and L. B. Gawthrop. Spaces 574 and 575.
- Electric Storage Battery Company, The, Philadelphia, Pa.—E. S. B. car lighting axle equipment operating in connection with a car lighting Exide battery; storage batteries for industrial, baggage and freight trucks, electric locomotives, gas car starting and lighting, motor buses, signals, etc. Represented by William H. Palmer, Thomas L. Mount, E. H. Watkins, W. H. Payne, R. I. Baird, C. Tierney, F. P. Dereby, P. G. Downton, H. S. Mills, H. S. C. Folk, W. C. Leingang and H. W. Beedle. Space 402.
- Elwell-Parker Electric Company, New York.—Electric storage battery operated industrial elevating platform trucks and crane trucks. Represented by Lucian C. Brown, George W. Brown, A. D. Bowman, C. B. Cook, R. C. Howell, G. C. Isbester, H. G. Hansen, and W. C. Kershaw. Space 341.
- Emery, E., Pittsburgh, Pa.—Emery self-locking brake shoe keys; Mead-Morrison "Handi" rivet heating forges; Mead-Morrison "Handi" heating torches; standard machine taper pins, keys and channel pins. Represented by E. Emery, Paul C. Cady and William A. Mueller. Space 97.
- Enterprise Railway Equipment Company, Chicago.—Door operating mechanisms for load discharging cars. On track, load, discharging cars. Represented by Argyle Campbell, A. E. Zimmer, W. L. Gunnison, G. B. Dorey and R. T. Coyne. Spaces 584 and 585, track exhibit on Mississippi avenue.
- Equipment Specialties Company, Chicago.—Equipco all-metal bulkhead and ice grate for refrigerator cars; refrigerator car drain trap. Represented by L. L. Cohen and G. A. Hull. Space 375.
- Estate Stove Company, Hamilton, Ohio.—Estate station and caboose heaters. Represented by Lucian L. Kahn. Space 365.
- Everlasting Valve Company, Jersey City, N. J.—Everlasting blow-off cocks for locomotives; tender tank valve; round house service valves; tandem valve, model "X". Represented by John H. Allen and Edward N. Corning. Space 17.
- Ewald Iron Company, Louisville, Ky.—Solid and hollow staybolt iron; engine bolt iron. Represented by G. O. Boomer, John P. Bourke, W. R. Walsh, E. V. Shackelford and R. F. Kilpatrick. Space 535.
- Falls Hollow Staybolt Company, Cuyahoga Falls, O.—Hollow and solid staybolt iron (bolts and bars). Represented by C. M. Walsh, David G. Fitch, M. M. McCallister and J. C. Tucker. Space 313.
- Flannery Bolt Company, Pittsburgh, Pa.—Tate flexible staybolts; F B C welded flexible staybolts; Flannery telltale flexible staybolts; Flannery adjustable crown staybolts; rigid hollow staybolts; Flannery staybolt testers. Represented by J. Rogers Flannery, E. S. FitzSimmons, W. M. Wilson, F. K. Landgraf, Grover R. Greenslade, E. G. Flannery, Ernst J. Reusswig, James A. Murrian, John H. Murrian and B. C. Hooper. Spaces 592 and 593.
- Ford Company, J. B., Wyandotte, Mich.—Wyandotte cleaners, specialties and chemicals. Represented by B. N. Goodell, W. P. Scott, G. J. Lawrence and T. S. Blair. Space 519.
- Fort Pitt Malleable Iron Company, Pittsburgh, Pa.—Arch bar truck side frame. Represented by Frank J. Lanahan, Jos. H. Kummer and E. H. Holmes. Spaces 546 and 548.
- Franklin Railway Supply Company, Inc., New York.—Locomotive Booster—trailer application; Locomotive Booster—tender application; Franklin Butterfly type firedoor No. 8; McLaughlin flexible conduit; Franklin sleeve joint; removable driving box brass, showing grease cellar and Franklin adjustable driving box wedge; Precision power reverse gear; Ragonnet power reverse gear type "E." Represented by J. S. Coffin, S. G. Allen, H. F. Ball, W. H. Coyle, J. L. Randolph, H. M. Evans, W. T. Lane, P. Willis, S. D. Rosenfelt, J. McLaughlin, T. P. Whelan, P. Weiler, F. M. Ball, T. L. Reed, J. A. Talty, M. H. Roberts, F. R. Peters, C. W. F. Coffin, J. L. Bacon, E. D. deCaldwell and C. J. Buck. Spaces 414, 416, 422 and 424.
- Frost Railway Supply Company, The, Detroit, Mich.—Harvey friction draft springs; Harvey friction bolster cushions. Represented by George A. Cooper, Harry W. Frost and Harry W. Frost, Jr. Space 562.
- Gairing Tool Company, The, Detroit, Mich.—Counterbores; spotfacers; core drills; counterbore sets. Represented by E. Gairing, G. Landry, H. Eaton and J. Mull. Space 307.
- Galena-Signal Oil Company, Franklin, Pa.—Reception booth. Represented by L. J. Drake, J. E. Linahan, G. L. Morton, D. L. Eubank, N. E. Sprowl, L. K. Morrison, W. A. Truice, I. T. Burney, C. McNair, W. W. Breckenridge, A. J. Harner, L. A. Druke, C. C. Creighton, J. S. Brown, C. G. Melvin, W. H. Foster, A. J. Howley, E. A. Blomgren, F. M. Shelton, R. R. Vinnedge, R. J. McQuade, P. H. Stack and F. C. Langdon. Space 32.
- Gardner Governor Company, Quincy, Ill.—Gardner XH Type vertical water cooled compressor direct connected to motor; Gardner totally enclosed flood lubricated power pump. Represented by C. I. White and E. F. Schaeffer. Space 330.
- Garford Motor Truck Company, The, Lima, O.—Model 80 with I.e.I. body; model 50 chassis; Garford Greyhound parlor car; Garford Greyhound parlor car; Garford Greyhound 21 P.A.Y.E. Represented by Paul Moore, W. E. Conway, Frank E. Borer, W. J. Baumgartner, L. L. Goble, C. P. Sharpless and H. Happersburg. Spaces 25 and 26. Motor Transport Exhibit.
- Garlock Packing Company, The, Palmyra, N. Y.—Railway mechanical packing service; Garlock quality controlled railroad packings. Represented by M. P. Junkin. Space 536.
- General American Car Company, Chicago.—Reception booth. Represented by LeRoy Kramer, O. J. Parks and R. R. Weaver. Space 509.
- General Electric Company, Schenectady, N. Y.—Electric and oil-electric locomotives and gas-electric cars; car shop control equipment; motors; arc welding equipment; flow meter equipment; fabrol and textolite gears; flood lighting projectors; fused quartz; photo electric cell. Represented by C. C. Pierce, R. F. Goggin, C. B. Keyes, W. J. Hedley, B. S. Pero, F. S. Hartman, R. M. Shoop, L. E. Rightmyer, W. H. Sigourney, W. A. Woolford, F. P. Jones, C. K. West, J. J. Liles, J. A. Boers, F. A. Kroner, W. S. Leggett, Lynn Covey, W. J. Hanley, R. S. Bennett, C. Dorticco, O. E. Turner, H. L. Monroe, Edward Taylor, J. G. Barry, G. P. Baldwin, E. P. Waller, John Roberts, C. S. Bailey, W. B. Potter, H. L. Andrews, J. B. Cox, M. C. Fitzgerald, H. S. Baldwin, J. P. Jones, J. M. Hollister, C. C. Runner, C. F. Pittman, J. A. Wilson and F. H. Penney. Spaces 5 and 60 to 76, inclusive; and on track.
- Gerrard Wire Tying Machine Company, Chicago.—Model "B" machines for strapping by wire boxes weighing up to 250 lb. for the protection of contents against breakage and pilferage; model "G" or the Little Giant machine for strapping boxes weighing upward from 250 lb.; demonstration of model "G" machine in Uni-Lastic stowage for the tying by No. 8 gage wire of solid carloads of barrels, paper, drums and other merchandise. Represented by T. J. King, W. M. Purdy and A. Larsen. Spaces 317 and 319.
- Globe Railway Equipment Company, St. Louis, Mo. Space 119 and track.
- Graham-White Sander Corporation, Roanoke, Va.—Graham-White locomotive sanders; and spreaders. Represented by James Frantz, W. L. Ranson, W. H. White and J. H. Burwell. Space 542.
- Henry Giessel Company, Chicago.—Water coolers for railroad cars; water filters; ventilators. Represented by Henry Giessel, Frank N. Grigg and S. W. Midgley. Space 40.
- Gill Railway Supply Company, Peoria, Ill.—Grisco cooling compound; Grisco driving box with adjustable quarter brasses. Represented by E. H. Hartenstein, H. C. Gullette and D. H. French. Space 325.
- Gisholt Machine Company, Madison, Wis.—28 inch by 9 3/4 inch—4L turret lathe; 21 inch by 4 3/4 inch—3L turret lathe; 2 3/4 inch by 10 inch—4B Universal turret lathe; internal and valve link grinder. Represented by W. J. Hannum and Ellis F. Muther. Spaces 844 and 846.

- Goddard & Goddard Company, Detroit, Mich.—Production milling cutters for use in locomotive shops, such as slab milling locomotive side and main rods, channeling cutters, helical cutters and reamers. Represented by A. N. Goddard, C. H. Wallace, E. E. Gunter, W. E. Moulton, Dix Proctor, Joseph Sample and C. W. Moore. Spaces 963 and 965, Machinery Hall.
- Gold Car Heating & Lighting Company, Brooklyn, N. Y.—Gold's vapor, steam, wire wound indirect, and electric systems of car heating; automatic temperature control for car heating systems, offices, stations, etc.; Gold's 2 inch steam connections; pressure regulators and other locomotive car heating equipment. Represented by E. E. Gold, E. B. Wilson, F. W. Dearborn, H. C. Poillon, A. B. Strange, J. O. Brumbaugh, Franklin H. Smith, W. H. Ivers, A. D. Stuver, Tom Moore, F. W. Moore, C. W. Stevens and A. G. Richards. Spaces 350, 351, 352 and 353.
- Goodall Rubber Company, Inc., Philadelphia, Pa.—Semi-metallic coal sprinkler hose; "Subway" brand tie-tamper; locomotive cleaner; shop air hose. Represented by Alfred W. Swartz, George B. Wood, J. Wilbur Hoff, C. P. Greene, M. T. Rhodes and F. A. Lewis. Space 328.
- Goodrich Rubber Company, B. F., Akron, O.—Reception booth. Represented by E. A. Bedele, B. T. Moffatt, Frank Flavel, Aden R. Miller and F. W. Wocher. Spaces 18, 20 and 22.
- Goodyear Tire & Rubber Co., Inc., Akron, Ohio.—Reception booth. Represented by C. R. Weaver, W. H. Oliver, Tom Plunkett, Jr., T. M. Black and W. T. Bell. Space 3.
- Gould Coupler Company, The, New York.—Cast steel truck side frames TF-5077, TF-5078 and TF-5080; freight, passenger and locomotive couplers; passenger car yokes; car lighting equipment; storage batteries. Represented by W. S. Gould, Homer Johnstone, P. H. Simpson, G. R. Berger and K. Smith. Spaces 130 and 132.
- Gould & Eberhardt, Irvington, N. J.—32 inch Invincible Gould & Eberhardt shaper arranged with latest improvements. Represented by H. E. Eberhardt, C. L. Cameron, F. G. Eberhardt and J. J. Duffy. Space 812, Machinery Hall.
- Graham Brothers, Detroit, Mich.—Model 445 twelve passenger parlor coach; Model 202 twenty-one passenger street car type coach; Model 222 stage with 205-V cab on 158-in. wheelbase, ton-and-a-half chassis; Model 451-V canopy on 126-in., one-ton chassis. Represented by A. H. Ferrandou and H. A. Kaufmann. Spaces 12, 14 and 16, Motor Transport Exhibit.
- Gray Company, G. A., Cincinnati, Ohio.—Planers, maximum service type. Represented by August Marx, Tell Berna and Phillip Leisinger. Spaces 937, 939 and 941, Machinery Hall.
- Griffin Wheel Company, Chicago.—Chilled iron car wheels. Represented by A. A. Hale, F. B. Flinn, C. P. Whitcomb, J. L. Grant and George Acker. Space 620.
- Grip Nut Company, Chicago.—Grip nut products. Represented by W. E. Sharp, Geo. P. Hoffman, J. B. Whitenack, E. H. Wood, J. P. Carney and E. J. Tierney. Space 624.
- Hale-Kilburn Company, Philadelphia, Pa.—Standard coach seats; models of seating used on large foreign railways; models of seats for intercity and suburban service; rotating chairs; reclining chairs; parlor car chairs; models of DeLuxe motor bus chairs and seats. Represented by R. D. Day, H. L. Beyer, W. M. Swope, R. F. Stubblebine, H. B. Gengenbach, W. J. Clair, R. O. Young, W. G. Flood and L. Weisenburger. Spaces 408 and 410.
- Hall Draft Gear Corporation, Watervliet, N. Y.—Friction draft gear. Represented by C. W. Sherman and J. M. Hall. Space 572.
- Hanlon Locomotive Sander Company, Winchester, Mass.—A-103 track sander; Duplex air operating valve; Reflex Bulls-eye water gages. Represented by William J. Hanlon and John H. Hanlon. Space 168.
- Hanna Engineering Works, Chicago.—Hanna pneumatic mud ring riveter; Hanna pinch bug riveter; will heat rivets electrically and drive them in representative mud ring and center sill sections. Represented by A. J. Jensen and J. C. Hanna. Spaces 855 and 857, Machinery Hall.
- Hanna Stoker Company, The, Cincinnati, Ohio.—Locomotive stoker complete. Represented by W. T. Hanna, John McVey, George D. Peverall, J. T. Cahill, W. H. Hopple and Frank K. Tutt. Space 139.
- Hauck Manufacturing Company, Brooklyn, N. Y.—Low pressure oil burners; Venturi suction torches and forges. Represented by F. John Schwenk and G. N. Broadhurst. Space 95.
- Heald Machine Company, The, Worcester, Mass.—Special cross-compound air pump; grinding machine. Represented by A. R. Sleath, S. T. Massey, J. N. Heald and Roger Heald. Space 968, Machinery Hall.
- Heywood-Wakefield Company, Wakefield, Mass.—Complete line of seats for parlor cars, coaches, gas-electric cars and motor buses. Represented by E. C. Lang, G. E. Cornwall, Bertram Berry, T. D. Owler, F. N. Grigg, and E. Foremen. Space 520.
- Houghton & Co., E. F., Philadelphia, Pa.—Working exhibit of heat treating and testing spring steel; metal working products; liquid heating mediums of hardening, drawing or tempering; lubricating oils; Vim leather packing; Vim leather belt; rust preventatives; quenching and tempering oils; cutting oils; carburizers; grinding compound; metal cleaning compounds; surface hardening compound. Represented by C. W. Nohl, Frank MacNamara, H. C. Finck, J. Coleman Bentley, George W. Pressell and Walter Buechner. Space 655.
- Housley Flue Connection Corporation, Indianapolis, Ind.—Housley safety washout plugs; Housley safety arch tube plugs. Represented by Robert B. Housley. Space 653.
- Hubbard Steel Foundry Company, East Chicago, Ind.—Hubbard crosshead. Represented by R. B. Hill and G. W. Lillie. Space "H."
- Hulson Grate Company, Inc., Keokuk, Iowa.—Complete one-half size model Hulson locomotive grate with fire-box section, showing grate arrangement for Mikado type locomotive, fire-box 108 in. by 84 in. Represented by A. W. Hulson, W. L. Trout and J. W. Hulson. Space 306.
- Hunt-Spiller Manufacturing Corporation, Boston, Mass.—Hunt-Spiller Gun Iron locomotive parts for cylinder bushings, piston heads, piston bull rings, cylinder packing rings, Dunbar packing rings, Hunt-Spiller Duplex packing rings and Duplex springs; piston valve bushings; piston valve bull rings; piston valve packing rings; crosshead shoes; shoes and wedges; floating rod bushings, knuckle pin bushings. Represented by J. G. Platt, F. M. Weymouth, V. W. Ellet, A. B. Root, Jr., Elbridge E. Clarke, E. J. Fuller, C. L. Galloway, F. B. Hartman, R. R. Wells and F. W. Lampton. Spaces 564 and 565.
- Huron Manufacturing Company, Detroit, Mich.—Huron washout and arch tube plugs. Represented by H. N. Reynolds, E. H. Willard, M. T. Willard, J. M. Borrowdale, S. W. Midgley, and E. C. Roddie Jr. Spaces 38 and 42.
- Hutchins Car Roofing Company, Detroit, Mich.—Models showing how the same Standard A.R.A. dry lading all-steel roof is applied to A.R.A. cars, single sheathed car, and double sheathed wood car. Represented by J. F. Comee, F. C. Dunham, J. T. Martyn, C. F. Pape, W. D. Thompson, and A. R. Wilson. Space 616.
- Hyatt Roller Bearing Company, Newark, N. J.—Hyatt roller bearings for journal boxes, turntables, transmissions, industrial trucks, cranes and general shop equipment; new narrow center Hyatt line shaft roller bearings. Represented by V. N. DeLamater, J. P. Rapp, K. B. Litzelman, W. Sampson, H. A. Brown, Jr., H. O. K. Meister, H. B. Jernee and H. M. Carroll. Spaces 135 and 137.
- Illinois Steel Company, Chicago, Ill.—Multiple wear wheels; light weight freight car wheels; MCB axles; tie plates; fabricated center sill and rolled sections of center sill and side sill; samples of structural bar and rail mill sections. Represented by P. W. O'Brien, O. H. Baker, C. B. Friday, E. G. Sutcliffe, G. Monk and C. R. Moffatt. Space 420.
- Independent Pneumatic Tool Company, Chicago.—Representative types of all Thor pneumatic tools, including rivet busters, close corner drills, pigmy drills, both reversible and non-reversible piston air drills in five sizes, chipping hammers, light and long stroke riveting hammers, portable pneumatic motor hoists, electrically-driven drills, screw drivers, reamers, grinders and accessories. Represented by John D. Hurley, R. S. Cooper, A. Anderson, I. T. Cruice, F. B. Hamerly, R. T. Scott, H. G. Keller, C. E. Leonard, A. L. Schuhl, W. E. Dougherty, J. A. Adams, F. H. Charbono, R. E. Kelly, C. E. Fowler, W. H. Rosevear, W. A. Nugent, H. C. Halbert, H. F. White, V. W. Robinson, F. J. Passino, F. W. Buchanan and J. P. Fletcher. Spaces 556 and 557.
- Ingersoll Milling Machine Company, The, Rockford, Ill.—Ingersoll milling cutters. Represented by A. A. Braid. Space 934, Machinery Hall.
- Ingersoll-Rand Company, New York.—Air compressor; pneumatic tools; oil-electric locomotive and appliances. Represented by George A. Gallinger, W. A. Johnson, G. C. Williams, J. F. Kroske, C. C. Lance, F. M. Cross, S. J. Thompson, John Green and F. G. Palen. Spaces 57, 59, 61, 63 and 65, and on track.
- International Harvester Company of America, Chicago.—29-passenger International Harvester motor coach; model 63 three-ton International Harvester motor truck; McCormick-Deering industrial tractor. Represented by W. F. McAfee, G. A. Gibson and R. J. Harter. Space 18, Motor Transport Exhibit.
- International Machine Tool Company, Indianapolis, Ind.—12-¼ inch-bore Libby turret lathe equipped for turning railroad pins. Represented by J. A. Villard and Roy Hunter. Space 870, Machinery Hall.
- International Motor Company, New York.—Complete stripped chassis and six-cylinder engine 10-ton tractor and trailer unit; Mack aluminum container on ramps; standard city type bus showing construction details such as joints, fixtures, flooring, etc. Represented by R. H. Hauer, George H. Scragg, C. B. Hatch, A. B. Sanders, P. P. Crafts, J. H. Keene, E. W. Lawrence, E. L. Anderson, C. Erskine, M. L. McGrew, A. Fenner, E. E. Wyman, D. C. Fenner, and A. F. Callison. Space 17, Motor Transport Exhibit.
- Irving Iron Works Company, Long Island City, N. Y.—"Vizablege" (visible edge) Salfar step, in various types adapted for Pullman cars, passenger coaches, cabooses and freight cars; Salfar running board for freight cars, with new shock absorbing feature. Represented by E. E. Brodhead, L. H. DeVoe, and William Noblett. Space 373.
- Irwin Auger Bit Company, The, Wilmington, O.—Complete line of wood boring tools. Represented by G. M. Riley and C. J. Robinson. Space 304.
- Jenkins Brothers, New York.—Valves of all types for steam, water, air, gas; car heating gaskets; sheet packing; gasket tubing and other mechanical rubber goods; Moncrieff Gage Glass. Represented by George Royal and C. B. Yardley. Space 563.
- Johns-Manville, Inc., New York.—Asbestos roofings and shingles; packings; Transite smoke jacks; pipe coverings; freight and passenger car insulations; fibre conduit; steam traps; Transite corrugated wood; Transite corrugated roofing and siding; waterproofing materials; power plant specialties; industrial flooring; ebony panels; insulating blocks; cements. Represented by George A. Nicol, Jr., J. C. Younglove, R. P. Townsend, Wm. N. Allman, P. R. Austin, J. D. Baker, C. E. Bryant, W. R. Bush, E. L. Colopy, C. S. Clingman, A. F. Eichhorn, C. D. Folsom, F. J. Horne, W. J. Hennessy, J. D. Johnson, H. L. Leach, P. D. Mallay, C. E. Murphy, Thom. O'Leary, Jr., L. Papineau, C. M. Patten, E. O. Roby, P. E. Redding, H. B. Sewell, W. J. Stewart, J. H. Trent, F. C. Vandervort, L. S. Wilbur. Spaces 512, 514 and 516.
- Jones & Lamson Machine Company, Springfield, Vt.—Hartness flat turret lathe, bar machine turning link motion pins; Hartness flat turret lathe, 17-in. chucking machine turning valve spider followers; J & L staybolt attachment; Flanders ground taps; Hartness automatic die head (high speed series with ground and lapped chasers); Hartness screw thread comparator (bench type). Represented by H. S. Beal, W. J. Grimm, G. H. Brigham, B. L. Billings, D. E. Miller and H. C. Miller. Space 847, Machinery Hall.
- Jones & Laughlin Steel Corporation, Pittsburgh, Pa.—J. & L. junior beam; special railroad car sections; spikes; tie plates; standard sections; wire products; car and dating nails; concrete reinforcing bars; cold finished steel; jalisco steel and products. Represented by J. D. Allen, G. D. Branton, C. E. Conley, T. C. Ham, R. D. Jenks, R. M. Kilgore, Wm. Miller, T. G. Roberts and A. A. Wagner. Spaces 409 and 411.

- Joyce-Cridland Company, The, Dayton, Ohio.—Lifting jacks. Represented by William F. Bippus, Harry Brock, A. S. Beatty, C. H. Brown, and R. L. Skidmore. Spaces 607 and 609.
- Kearney & Trecker Corporation, Milwaukee, Wis.—New No. 4B plain milling machine shown in actual operation milling steel billets. Represented by George E. Gustafson, F. G. Jackson and M. J. Schmitt. Spaces 967 and 969. Machinery Hall.
- Keller Mechanical Engineering Corporation, Brooklyn, N. Y.—Type BL Keller automatic tool room machine with all latest improvements; Type R-6 Keller universal cutter and radius grinder; Type BK flexible shaft grinder, bench type and on roller floor stand, sizes BK-1, BK-2 and BK-4. Represented by Jules Diercks, Henry Schreiber, P. D. Brown and George I. Croll. Spaces 833 and 835, Machinery Hall.
- Keller, William H., Inc., Grand Haven, Mich.—Riveting, chipping and scaling hammers; drills; grinders; rammers; rivet busters; staybolt riveters; jam riveters; holders-on; pneumatic tool accessories. Represented by Guy S. Warren, Ernest Shaff and J. R. Space. Spaces 153 and 155.
- Kerite Insulated Wire & Cable Company, Inc., New York.—Reception booth. Represented by B. L. Winchell, Jr., J. W. Young, J. A. Renton, J. A. Hamilton, W. H. Fenley, C. A. Reeb and C. M. Deardorff. Spaces 521 and 523.
- Key-Bolt Appliance Company, Orchard Park, N. Y.—Key bolts for bolting up. Represented by R. H. Peters and W. K. Miller. Space 172.
- Keyoke Railway Equipment Company, Chicago.—Various types of Murray friction draft gear and Murray cast steel coupler yokes. Represented by R. J. Cook, W. J. Robider and Charles W. Garrison. Space 309.
- Keystone Grinder & Manufacturing Company, Pittsburgh, Pa.—Hand, foot and motor power railroad tool grinders. Represented by S. S. Newman and L. J. Cooney. Space 966, Machinery Hall.
- King Pneumatic Tool Company, Chicago.—Pneumatic riveting hammers, chipping and caulking hammers; rivet cutters, rivet sets, pneumatic tool accessories. Represented by John M. Butler, George A. Barden, and J. C. Buckels. Space 541.
- Klasing Car Brake Company, Chicago.—Improved Klasing hand brake. Represented by A. K. Klasing and Thomas L. Gaddis. Space 379.
- Landis Machine Company, Wayneboro, Pa.—1-1/2 in. Landis double head staybolt threading machine; Landis reverse taper die head; 4 in. Landis pipe threading and cutting machine; Land-Matic head; Lanco head; Victor Taps. Represented by C. N. Kirkpatrick and F. C. Delcher. Spaces 872, 874 and 876, Machinery Hall.
- Lang Body Company, Cleveland, O.—Bus body, showing the various steps of construction and different features. Represented by E. J. Lang, W. C. Naegel and W. Lutey. Space 19. Motor Transport Exhibit.
- Lebanon Steel Foundry, Lebanon, Pa.—Electric furnace railroad castings for locomotives, passenger and freight cars and track work. Represented by W. H. Worrlow, A. J. McDonald, T. V. Blodgett, and P. E. Gerhard. Space 81.
- LeBlond Machine Tool Company, The R. K., Cincinnati, O.—30-in. LeBlond heavy duty geared head lathe; 21-in. heavy duty geared head lathe; 11-in. heavy duty rapid production lathe; No. 1 universal tool room grinder. Represented by Charles C. Carr, B. N. Brackman and W. E. Groene. Spaces 947 and 949. Machinery Hall.
- Lehman Machine Company, St. Louis, Mo.—22-24-1/2 in. by 11-ft. bed Lehman lathe, 16-speed geared head, with apron control of clutch for forward, reverse and brake, and complete with standard equipment and improved taper attachment fitted; Lehman oil groove milling machine. Represented by Paul Lehman, O. W. Johanning and Carl Richter. Spaces 875 and 877. Machinery Hall.
- Lehon Company, The, Chicago.—Mule-Hide waterproof and insulating products of all kinds including roofing for all types of buildings and cars; waterproof insulating paper for refrigerator cars, ice plants and refrigerators; waterproof fabrics and asphalt for waterproofing courses in bridges, tunnels and viaducts; special waterproof canvas car roofing; asphalt shingles. Represented by Tom Lehon, J. W. Shoop and F. T. Carpenter. Space 16.
- Libbey Glass Manufacturing Company, The, Toledo, O.—Libbey Reflex gage glasses; high pressure gage glasses; bulls-eye lubricator glasses; lantern globes; semaphore and switch lamp lenses; oil cup glasses; water gauge protector glass. Represented by J. A. Carson and J. C. Keane. Space 326.
- Liberty Manufacturing Company, Pittsburgh, Pa.—Various types of Liberty and Lagonda arch and superheater tube cleaners. Represented by H. A. Pastre and Thomas F. Crawford. Space 632.
- Link-Belt Company, Chicago.—Silent chain drives. Represented by Ralph S. Dyson, James S. Watson and Howard Burkholder. Space 146.
- Locomotive Finished Material Company, The, Atchison, Kan.—Locomotive steel piston; Universal and combination bull and cylinder packing rings; blow-off muffler. Represented by R. L. McIntosh and Olive Hastings. Space 90.
- Locomotive Firebox Company, Chicago.—Working model of locomotive boiler equipped with Nicholson Thermic syphons; firebox built quarter size showing Nicholson Thermic syphons. Represented by G. R. Carr, W. S. Carr, G. N. DeGuire, L. R. Pyle, A. A. Taylor, C. M. Rogers, John Baker and C. A. Seley. Spaces 382, 383, 384 and 385.
- Locomotive Stoker Company, Pittsburgh, Pa.—Working model Duplex type D-1 stoker; Working model type D slope sheet coal pusher; Full size types D-1 A, D-3 and D-4 Duplex stokers; Full size Elvin stoker. Represented by W. S. Bartholomew, J. I. Byrne, O. B. Camps, W. G. Clark, D. F. Crawford, H. D. Eckerson, V. B. Emrick, A. B. Fahnestock, R. G. Kelley, N. M. Lower, H. G. Mastin, E. F. Milbank, L. E. Osborne, E. Prouty, L. V. Stevens, K. M. Stoller, A. L. Whipple, A. N. Willisie and H. C. Woodbridge. Spaces 403, 404 and 407.
- Long, Jr., Company, Chas. R., Louisville, Ky.—Paint Panels, etc. Represented by Chas. R. Long, Jr., A. G. Hollingshead, G. S. Turner, W. H. Heckman, J. M. Monroe, J. S. Lemley and S. W. Russell. Space 579.
- Lovell & Company, F. H., Arlington, N. J.—Electric, watertight and steam-tight fixtures for locomotive, roundhouse, subway, dock and ashpit use. Represented by A. D. Hobbie, F. W. Dressel, J. C. Wylie, and H. S. Hoskinson. Spaces 631 and 633.
- Lucas Machine Tool Company, The, Cleveland, O.—No. 43 "Precision" horizontal boring, drilling and milling machine; 50-ton Lucas power forcing press. Represented by F. P. Sprague, O. L. Chapman and J. A. Leighton. Spaces 843 and 845. Machinery Hall.
- Lunkenheimer Company, The, Cincinnati, O.—Valves; lubricators, oil and grease cups; other engineering appliances. Represented by Howard J. Evans, W. M. Hood and Andrew Lauterbach. Spaces 531 and 533.
- Lukens Steel Company, Coatesville, Pa.—Two large flanged and dished steel heads, one 10 foot 7 1/2 inches diameter by 2 3/4 inches thick, the other 8 foot 3 inches outside diameter, 3 3/4 inches thick; small models of locomotives in operation. Represented by F. H. Gordon, G. T. Shants, Harry Loeb, A. Goodfellow, G. L. Gordon and G. R. Boyce. Spaces 4, A, B and C.
- Lymer Railway Equipment Company, Ltd., Montreal, Canada. Space 164.
- MacLean-Fogg Lock Nut Company, Chicago.—"M-F" lock nuts. Represented by J. W. Fogg, Clif Beaumont and J. A. MacLean. Spaces 370 and 371.
- MacRae's Blue Book Company, Chicago.—MacRae's Blue Book. Represented by Alex Smith, C. S. Wallace, W. P. Dent, G. M. Scorgie, F. O. Rice, Albert MacRae and Don Ilette. Space 207.
- Madison-Kipp Corporation, Madison, Wis.—Locomotive mechanical lubricators. Represented by William B. Wheeler and A. H. Flanagan. Space 35.
- Manning, Maxwell & Moore, Inc., New York.—Micro cylinder grinder; engine lathes; 32-in. shapers; 48-in. car wheel borer; axle burnishing lathe; locomotive jack; forging machine; power hammer; heavy duty rivet, bolt and nut machinery; hexagon turret lathe; guide bar grinder. Represented by T. S. Stephens, J. Wainwright, R. E. Dean, L. A. Gluckler, N. Alledice, W. A. Deems, A. Wood, T. J. Baumis, L. A. Pearsall and Edward Garfield. Spaces 801 to 823, inclusive, Machinery Hall.
- Massachusetts Mohair Plush Company, Boston, Mass.—Mohair plush for car and bus seats. Represented by H. M. Bliss, A. B. Mason and W. W. Melcher. Spaces 635 and 637.
- McCabe Manufacturing Company, Lawrence, Mass.—Working model of pneumatic flanging machine; flanged flange sheets. Represented by Fred H. McCabe and Edward McCabe. Spaces 316 and 318.
- McConway & Torley Company, The, Pittsburgh, Pa.—Pitt pivoted passenger coupler with centering device and quadruple-shear yoke; type "D" passenger coupler similarly equipped; type "D" freight car and locomotive couplers; coupler for gasoline-electric cars. Represented by William McConway, Jr., I. H. Milliken, W. J. Regan, H. F. Dunbar, G. P. Ritter, Enoch George, Jr., T. A. Reynolds and W. C. Buske. Spaces 501, 503 and 505.
- McCrosky Tool Corporation, Meadville, Pa.—McCrosky "Wizard" quick-change chucks and collets; "Ideal" railroad reamers; turrets; self-centering steadyrests; "Super" adjustable reamers. Represented by R. W. Thomas, K. B. Spaulding and W. J. Greenleaf. Space 810. Machinery Hall.
- Metal & Thermit Corporation, New York.—Materials and apparatus for welding locomotive frames and other sections by the Thermit process; new method for using Thermit for this class of work will be shown. Represented by W. R. Hulbert, H. D. Kelley, William Aldrich, R. L. Browne and J. G. McCarthy. Space 136.
- Midgley & Borrowdale, Chicago.—"Protector" metal bound felt weather strip for passenger cars; Chaton fibre dust guards; Massachusetts mohair plush; Huron washout plugs for locomotives; Superior Steel and Malleable Casting Company products; Giessel North Pole water coolers. Represented by S. W. Midgley and J. M. Borrowdale. Spaces 38 and 42.
- Milar, Clinch & Co., Chicago.—Continental car cement; Gibbons spray equipment; Woodruff syphon jet system; Wolfe triple valve bushing grinder. Represented by K. A. Milar, D. L. Clinch and A. W. Gillespie. Space 366.
- Milburn Company, The, Alexander, Baltimore, Md.—Acetylene generators; Welding and cutting torches; gas pressure regulators; portable carbide lights; oil burners and preheaters; paint sprays. Represented by A. F. Jenkins, C. R. Pollard and E. P. Boyer. Spaces 215 and 217.
- Miner, Inc., W. H., Chicago.—Friction draft gears; friction buffing devices; spring draft gears; safety hand brakes; side bearings; refrigerator car door fasteners; bolster locking center pins. Represented by W. H. Miner, A. E. Biddle, J. F. O'Connor, C. F. McCuen, J. H. Link, A. P. Withall, J. R. Mitchell, R. H. Weber, G. Q. Lewis, B. S. Johnson, W. E. Robertson and G. A. Johnson. Spaces 586 and 587.
- Monarch Products Company, Red Bank, N. J.—Monarch grinding compounds. Represented by W. E. Soper. Space 167.
- More-Jones Brass & Metal Company, St. Louis, Mo.—Pressure chill cast locomotive crown bearings, rod brasses and bushings, and other wearing parts; semi-finished wearing parts, cocks, valves, and miscellaneous fittings; self-oiling crosshead gibs; self-oiling lateral plate for driving boxes; side-oiling engine and trailer truck bearings; valve gear bushings; A. R. A. journal bearings; babbit metals. Represented by S. W. Crawford, A. J. Evans and W. H. Bies. Spaces 320 and 322.
- Morton Manufacturing Company, Chicago.—Acme vestibule diaphragms, vestibule curtains, window curtains, window weatherproofing, sash locks; Kass safety-treads, step boxes, flights of steps, brake steps for freight cars; Acme upper buffing mechanisms for stop of diaphragm face plate; Chanarch steel flooring; tail gates; anti-pinch shields for passenger car end steel doors. Represented by H. U. Morton, W. M. Wampler, C. Allen Koenig, George H. Ord, F. H. Harper, F. N. Grigg and R. R. Gaines. Spaces 570 and 571.

- Morton Manufacturing Company, Muskegon Heights, Mich.—Heavy duty draw-cut shapers for railroad work; car journal bearing finishing mill; Robinson automatic air hose couplings; O. K. tools and holders as used with Morton heavy duty draw-cut shapers. Represented by Henry E. Morton, George F. Goble, H. Earl Morton and Matt H. Morton. Spaces 862, 864, 866 and 868. Machinery Hall.
- Mudge & Company, Chicago.—Mudge Security unit spark arrester for locomotives; Mudge Volume blower for private and dining cars; Mudge Peerless Ventilator for passenger train cars; Mudge brake pipe clamp and angle cock holder. Represented by Albert C. Force, Frank H. DeBrun and Arthur R. Fletcher. Space 89.
- Nathan Manufacturing Company, New York.—Injectors; Boiler checks; hydrostatic lubricators; mechanical lubricators; low water alarms; water column; balanced lever starting valves. Represented by J. F. Farrell, Richard Welsh, W. R. Walsh, J. E. Brandt, F. Ehredt, R. H. Jenkins, F. C. Davern, W. L. Barr, J. S. Cates, H. G. Cook, W. G. Lockwood, T. J. Murphy, Geo. J. Hatz, S. M. Dolan, F. E. Marsh, Wm. S. Harris and J. T. Dohm. Spaces 582 and 583.
- National Brake Company, Inc., Buffalo, N. Y.—Different types of Peacock brakes for both passenger and freight equipment. Represented by F. D. Miller and W. D. Brewster. Space 326.
- National Lead Company, New York.—Red lead; white lead; linseed oil; liquid red lead. Represented by F. M. Hartley, Jr., W. Hugh Cochrane and F. E. Dodge. Space 121.
- National Lock Washer Company, The, Newark, N. J.—Car window equipment consisting of sash locks, curtain fixtures, curtain rollers, etc. Represented by C. H. Loutrel, J. Howard Horn, G. LaRue Masters, A. W. Preikschat and Daniel Hoyt. Space 539.
- National Malleable and Steel Castings Company, Cleveland, O.—Freight passenger and locomotive couplers; freight and passenger yokes, draft gears, engine coupler pockets and buffers; Goodman wrecking hooks; journal boxes and wedges; hand brake mechanism; car door fixtures; miscellaneous car castings. Represented by T. W. Aishton, A. J. Bazeley, C. K. Brooks, A. O. Buckius, Jr., J. J. Byers, T. H. Doyle, G. A. Faltz, G. R. Farrell, E. H. Fathauer, Charles Gaspar, H. W. Gilbert, J. F. Hutson, J. H. Jaschka, C. H. Krakau, H. T. Krakau, F. K. LeVake, W. C. Lewis, H. L. Maus, C. H. McCrea, F. E. Moffett, Benj. Nields, Jr., G. R. Rasmussen, D. Robinson, R. R. Root, E. H. Schmidt, E. V. Sihler, J. A. Slater, S. L. Smith, F. Snyder, H. L. Spence, E. O. Warner and L. S. Wright. Spaces 613 and 615.
- National Pneumatic Company, Inc., Philadelphia, Pa.—Platform door and trap operating and controlling devices, demonstrated on full size model of car-end and platform. Represented by T. W. Casey, P. R. Forman, J. H. VanderVeer, R. S. Frehse, A. F. Paul, G. W. Hall and H. D. Mallison. Spaces 126 and 128.
- National Railway Appliance Company, New York.—Reception booth. Represented by B. A. Hegeman, Jr., H. A. Hegeman, W. C. Peters, J. M. Pratt, W. E. Kelly and R. L. Cluverius. Space 622.
- National Railway Devices Company, Chicago.—Shoemaker radial fire-door; Shoemaker vertical fire-door; full size illustration of new model No. 2 Shoemaker radial fire-door. Represented by Jay G. Robinson and E. J. Gunnison. Space "E," Porch.
- National Safety Appliance Company, San Francisco, Cal.—Automatic train control. Represented by Edward C. Wilson, E. W. Stone and J. C. Anderson. Space 404.
- National Safety Devices Company, Waterloo, Iowa.—New automatic whistle blower; Pre-Start alarm and throttle lock. Represented by E. H. Batchelder, Jr., A. I. Woodring and W. G. Lamb. Space 308.
- National Tube Company, Pittsburgh, Pa.—"National-Shelby" seamless mechanical tubing showing range of size and wall-thickness; "National-Shelby" hot rolled and cold drawn locomotive boiler tubes, superheater tubes, seamless pipe for locomotives; "National" railway signal pipe, copper bearing steel pipe; models showing the method of manufacturing "National" scale free pipe. Represented by W. L. Schaeffer, G. N. Riley, R. J. McAuliffe, W. F. Jones, P. J. Conrath, J. W. Kelly, H. R. Redington, H. E. Passmore, W. S. Biting, L. J. Gelshenen, J. G. Bateman, C. F. Roland and J. M. Denney. Spaces 547 and 549.
- New York Air Brake Company, The, New York.—New piston packing ring for air compressors; Perfect hose coupling; steam piston and rod assembly for air compressors; centrifugal air pump strainer; oil atomizing lubricator. Represented by J. H. Watters, C. E. Leach, E. F. Wentworth, George A. Kleifges, H. A. Flynn, H. T. Wentworth, C. B. Miles, J. B. Brown, B. Hyman and J. D. Cartin. Space 30.
- Niles Gear Company, Hamilton, O.—Reception booth. Represented by M. E. Estabrook. Spaces 929 and 931.
- Niles Tool Works Company, The, Hamilton, O.—90 in. journal turning machine; 90 in. quaterning machine; 42 in. by 10 ft. time saver planer; 27 in. by 16 ft. time saver engine lathe; 48 in. car wheel borer. Represented by L. C. Cole, B. A. Donahue, I. J. Fisher, Edward L. Leeds, W. S. McCormick, George R. Mills, W. R. Mullinix, John Philpot, R. H. Rausch, I. A. Ross, D. H. Teas, B. A. Tozzer, A. E. R. Turner, N. C. Walpole, Harold F. Welch and D. S. Woods. Spaces 822 and 836.
- Norton, Inc., A. O. Chicago.—Lifting jacks for car and locomotive work. Represented by R. J. McKay, J. W. Hobbs, H. I. Wilson, O. L. Wright, W. R. Kelly, C. H. Smith, R. D. Bates and E. W. Hanegan. Spaces 107 and 109.
- Norton Company, Worcester, Mass.—Norton 16-in. and 40-in. by 120-in. piston rod grinder in operation; Norton type B wheel driving units; Norton type S floor stand, motor driven. Represented by Paul Hoffman, George C. Montague, H. N. Cudworth and Hans Wickstrom. Spaces 944, 946, 948 and 950. Machinery Hall.
- Nettall Company, R. D., Pittsburgh, Pa.—Actual operations of gear cutting on small demonstrating machine; new type flexible pinions for electric locomotives; heat-treated and hardened gearing with ground teeth for general industrial use. Represented by R. F. Fiske, J. E. Mullen, and R. W. Young. Space 92.
- Nutting Truck Company, Faribault, Minn.—"Blue Boy" steel trailer; Nutting freighthouse truck; Nutting "All-steel" steelnose truck. Represented by J. Faulkner Thomas and E. H. Thomas. Space G, Front Porch.
- Oakley Chemical Company, New York.—Blue prints; photographs; apparatus for applying Oakite materials and methods in modern railroad cleaning. Represented by C. R. McCann, D. X. Clarin, R. E. Powell, A. P. Hinton, V. D. Smith and Carl Johnson. Spaces 222 and 224.
- Ohio Brass Company, Mansfield, O.—Automatic air and electric coupler for multiple-unit car operation; propulsion bonds; porcelain insulation. Represented by C. A. Tomlinson, A. L. Price, M. W. Manz, F. E. Johnson, Nathan Shute, and Sidney Palmer. Spaces 332 and 334.
- Ohio Machine Tool Company, The, Kenton, O.—"Ohio" 32-in. Dreadnaught shaper. Represented by L. H. Peters. Spaces 953, 955 and 957. Machinery Hall.
- O. K. Tool Company, Inc. The, Shelton, Conn.—Complete line of holders and tools, featuring inserted tooth cutters in operation with a Rockford ridged mill; sectional inserted tooth hobs and slab mills. Represented by F. J. Wilson, Frederick Schroeder, R. K. Weddell, J. C. Kainer, H. E. French and E. Raduhn. Space 849. Machinery Hall.
- Okadee Company, The, Chicago.—"Okadee" blow-off valve; Tender hose coupler; automatic cylinder cock; front end hinge; water glass protector; drain valves. Represented by A. G. Hollingshead, Chas. R. Long, Jr., G. S. Turner, W. H. Heckman, J. M. Monroe, J. S. Lemley and S. W. Russell. Space 577.
- Okonite Company, The, Passaic, N. J.—Okonite rubber covered wires; car wires; Okocords; portable cords; friction and rubber tapes; varnished cambric cables; Okonite-Callender impregnated and super-tension cables. Represented by J. D. Underhill, W. R. Van Steenburg, A. L. Moncill, E. H. Moncill, F. J. White and R. N. Baker. Space 581.
- Oliver Electric & Manufacturing Company, Chicago.—See The Pyle National Company. Spaces 602, 604, 606 and 608.
- O'Malley-Bearse Valve Company, Chicago.—Multiple disk steam valves; journal bearings; brass castings. Represented by J. E. Brown, F. E. McCarthy and C. F. Pigott. Space 144.
- Osgood Bradley Car Company, Worcester, Mass.—Multiple-unit trailer coach for suburban service. Space, Mississippi Av. track exhibit.
- Oxweld Railroad Service Company, The, Chicago.—Reception booth. Represented by A. N. Lucas, J. W. O'Neill, C. S. Wright, W. A. Champieux, J. G. Tawse, F. C. Hasse, O. D. Falls, G. M. Crownover, F. H. Frye, W. Williams, R. W. Harvey, F. H. Haggerson, Wm. Jones, O. F. Ladtkow, O. D. Hays, R. R. Kester, M. A. Deaton, R. R. Browning, Hugh Reeder, C. B. Moore, M. C. Beymer, G. P. Bogert, Ross Webster, G. B. Walker, H. W. Schulze, W. E. Cotter, Leo Romney, W. A. Hogan, E. L. Williams and A. W. Whiteford. Space 33.
- Paige & Jones Chemical Company, New York.—Locomotive boiler feed-water treatment, "Wayside tank method". Represented by C. B. Flint and F. O. Paige. Space 372.
- Paint Products Corporation, Philadelphia, Pa.—Reception booth. Represented by H. C. Carpenter and A. Pierce Gregg. Space 359.
- Pantasote Company, Inc., The, New York.—Agasote headlining; Pantasote curtain materials; Pantasote car seating; Russialoid car seating; Durasote bus roof; Durasote dining car table tops. Represented by William A. Lake and William Anderson. Space 400.
- Parkesburg Iron Company, Parkesburg, Pa.—Genuine Charcoal Iron locomotive boiler tubes; samples of Parkesburg iron tubes removed after long service. Represented by W. H. S. Bateman, R. J. Sheridan, G. W. Denyven, J. R. Wetherald and G. A. Cardwell. Space 388.
- Paxton Mitchell Company, The, Omaha, Nebr.—Metallic piston rod, valve stem and air pump packing. Represented by H. J. Molloy, J. J. Keliher and L. J. McConnell. Space 525.
- Pels & Co., Inc., Henry, New York.—Gate shear, with adjustable upper knife, for 80-in. by 7/8-in. plate; New quadruple combined punch and shear, with built-in coping tool; bar, angle, tee, beam and channel shear, without changing knives; new style universal combined punch, shear, bar, angle and tee cutter; beam and channel cutter, with diagonal slide and 36-in. throats. Represented by T. C. Sternblad, E. E. Tailfer, George Miller, W. K. Stamets, A. W. Bissell and A. Kohlbusch. Spaces 863, 865, 867, 869 and 871. Machinery Hall.
- Penn Iron & Steel Company, Creighton, Pa.—Lewis staybolt iron, special staybolt iron and engine bolt iron; hollow drilled bolts; U. S. Navy chain iron. Represented by C. J. Nieman and L. W. Hicks. Space 552.
- Peoria Railway Brake Company, Chicago.—Hand brakes for freight cars. Represented by H. C. Smith and F. L. Ingraham. Space 170.
- Pilliod Company, The, New York.—Baker locomotive valve gear. Represented by R. H. Weatherly, H. B. Snyder, J. H. Cooper, J. D. Purdy and J. J. Donovan. Spaces 560 and 561.
- Pilot Packing Company, Inc., Chicago.—Pilot packing; Ehrhart decarbonizer; Pilot asbestos listing; Ripken automatic drifting valve. Represented by Joseph Sinkler and Robert Sinkler. Space 534.
- Pittsburgh Knife & Forge Company, Pittsburgh, Pa.—Dron forged center plates; drop forged journal bearing wedges; drop forged one-piece no-weld brake jaws; forged one-piece no-weld connection levers. Represented by Tom C. King. Space 654.
- Pittsburgh Steel Foundry Corporation, Glassport, Pa.—Freight car truck side frames and bolsters; Tender truck side frames. Represented by C. W. Howat, H. V. Seth, J. R. Forney, John Allison and Joseph F. Leonard. Space 123.
- Pittsburgh Testing Laboratory, Pittsburgh, Pa.—Attractoscope showing types and methods of inspection service. Represented by James Milliken, Frederick V. Green and Graham H. Lyons. Space 580.

Pocket List of Railroad Officials, The, New York.—Pocket List of Railroad Officials. Represented by Harold A. Brown, B. J. Wilson and J. Alexander Brown. Space 9.

Pratt & Lambert Inc., Buffalo, N. Y.—Vitalite railway enamel system. Represented by J. F. Gowing, E. L. Gorgor and S. S. Demarest. Space 517.

Pratt & Whitney Company, Division Niles-Bement-Pond Company, Hartford, Conn.—20-in. model B lathe; 16-in. model B lathe; 12-in. vertical shaper, model B; jig borer; 14-in. vertical surface grinder, model B; railroad small tool exhibit; gage exhibit; staybolt tap testing demonstration. All machines operating under power. Represented by W. P. Kirk, E. C. Shultz, A. H. D'Arcambal, W. Goult; W. E. Weingar, Boyd Nixon, B. A. Tozzer, E. J. Sullivan, Ralph Shultz and Fred Best. Spaces 822-836 and 921-931, Machinery Hall.

Premier Staybolt Company, The, Pittsburgh, Pa.—Locomotive staybolts. Represented by C. B. Woodworth, J. F. McGann and L. Finegan. Space 302.

Pressed Steel Car Company, Pittsburgh, Pa.—Reception booth; photographs. 30-cu. yd. capacity drop door type, air dump car on Georgia avenue between Pacific avenue and the Boardwalk. Represented by J. F. MacEnulty, N. S. Reeder, H. P. Hoffstot, C. E. Postlethwaite, F. O. Schramm, H. H. Gilbert, C. C. Clark, J. S. Turner, W. H. Wilkinson, J. G. Morrissey, F. H. Freshwater, F. L. Johnson, C. P. Mapp, C. H. Jackman and H. S. Hammond. Spaces 545 and 601, and on track.

Production Machine Company, Greenfield, Mass.—Grinding, polishing and finishing machines; abrasive belts. Represented by W. S. Howe and A. H. Behnke. Space 831.

Pyle-National Company, The, Chicago.—Turbo-generators; turbo-generators for automatic train control; turbo-generators for train and locomotive lighting; floodlights; headlight cases; electrical appliances for locomotives, cars, shops, flood light installations, etc., formerly manufactured by the Oliver Electric & Manufacturing Company. Represented by R. C. Vilas, L. H. Vilas, J. Will Johnson, Sr., William Miller, C. F. Owens, Crawford McGinnis, Alfred Murcott, C. S. Geis, J. L. Reese, P. S. Westcott, Thomas P. McGinnis, W. M. Graves, Jr., J. A. Amos, William Ross, J. J. Kennedy, E. H. Hagensick, G. C. Wright and George E. Haas. Spaces 602, 604, 606 and 608.

Q & C Company, The, New York.—Roller side bearings patented heat-treated grate bars; car replacers; emergency knuckles; piston rod lubricators. Represented by E. R. Packer, Godwin Shenton, L. T. Burwell, E. M. Smith and F. F. Kister. Space 630.

Quigley Furnace Specialties Company, Inc., New York.—Monolithic linings for locomotive firebox; Quigley refractory gun for applying plastic mixtures; demonstration of Hytempite for bonding refractories. Represented by W. S. Quigley, W. H. Gaylord, Jr., M. F. King, H. M. Miller and H. T. Matthew. Space 111.

Racine Tool & Machine Company, Racine, Wis.—Racine Junior hack saw, 4-in. by 4-in. motor driven; Racine high speed metal cutting machine, No. 5, 6-in. by 6-in. motor driven with three speed transmission; Racine No. 13 duplex band saw with two speed transmission and pedestal; Racine abrasive metal cutter, No. 17. Represented by S. P. Schafer and J. S. Toohey. Space 958.

Railroad Herald, The, Atlanta, Ga.—Copies of the Railroad Herald. Represented by E. C. Laird. Space 628.

Railway Devices Company, St. Louis, Mo.—"Western" angle cock holders; "Real" brake jaws; "Perfection" brake ratchets; "Top Notch" forged steel wedges; "Spiral" pipe clamps; "Sta-Rite" coupler release. Represented by Louis A. Hoerr, Roland M. Hoerr and Sterling Campbell. Space 618.

Railway Purchases and Stores, Chicago.—Magazines. Represented by H. B. Kirkland, K. F. Sheeran, J. P. Murphy and Edward Wray. Space 15.

Railway Review, Chicago.—Copies of Railway Review. Represented by Bruce V. Crandall, J. Elmer Gougeon, J. A. Walsh, W. H. Dickinson, W. W. Baxter and A. D. McIntyre. Spaces 12 and 14.

Railway Service & Supply Corporation, Indianapolis, Ind.—Journal box packing reclamation system. Represented by L. D. Grisbaum, F. H. Lutz and E. S. Pearce. Space 143.

Ralston Steel Car Company The, Columbus, O.—Model of car. Represented by F. E. Symons, B. C. Hanna, C. O. Rea and C. M. Cowgill. Space 558.

Reading Company—Pacific type locomotive; oil-electric locomotive; 70-ton gondola car. Represented by I. A. Seiders and E. A. Borell. Track exhibit on Mississippi Av.

Reading Iron Company, Reading, Pa.—Genuine wrought iron pipe; charcoal iron boiler tubes; engine bolt and stay bolt iron. Represented by R. I. Fretz, Donald Charlton, G. H. Woodroffe, C. T. Ressler, H. F. Mattern, F. M. English and J. K. Aimer. Space 122.

Reliance Machine & Stamping Works, Inc., New Orleans, La.—Locomotive rod cup greasing apparatus. Represented by E. B. Norman, Carl Sutter and George A. Pettit. Space 230.

Remington Typewriter Company, New York.—Bookkeeping machines for stores and material inventory ledgers; billing machines for M. C. B. billing;—voucher writing machines;—service booth, where complimentary stenographic service will be rendered to members and guests. Represented by A. T. Rose, H. W. Buse, R. A. Dennis, J. E. McKerracher and Mrs. H. J. Hedlund. Space 4-A.

Reo Motor Car Company, Lansing, Mich.—Model W six-cylinder chassis; Model W six-cylinder 21-passenger inter-city wicker chair car. Represented by W. C. Parker, T. T. O'Brien, W. W. Mitchell, R. D. Hilty, F. G. Barrett and M. S. Graham. Space 22. Motor Transport Exhibit.

Robinson & Co., Inc., Dwight P., New York.—Illuminated photographs. Represented by H. H. Kerr, C. H. Crawford, Lawrence Richardson, R. A. Langworthy and C. E. Harris. Space 329.

Rockford Machine Tool Company, Rockford, Ill.—26 inch Rockford Universal side shaper. Represented by M. M. Monson. Space 873, Machinery Hall.

Rodger Ballast Car Company, Chicago.—Hart Selective ballast and coal car with "Maxends." Represented by W. J. Hosceit and David Hindahl. Pennsylvania Railroad tracks.

Roehling's Sons Company, John A., Trenton, N. J.—Wire rope; slings; welding wire. Represented by F. J. Maple. Space 145.

Rome Iron Mills, Inc., New York.—Rome Superior staybolt Iron; Rome Perfection engine bolt iron. Represented by B. A. Clements, and C. C. Osterhout. Spaces 414, 416, 422 and 424.

Rooksby & Co., E. J., Philadelphia, Pa.—Cylinder boring bars, valve chamber boring bars; crank pin turning machines; valve seat rotary planing machines; cylinder flange facing machines. Represented by Edwin J. Rooksby and Jesse G. Haydock. Space 942. Machinery Hall.

Ryerson & Son, Inc., Joseph T., Chicago.—Ryerson inclined rail drill; Ryerson-Conradson geared head engine lathe; Ohio Machine Tool Company shaper; Swift Electric Welder Company Flue Welder; Spring Forming Equipment. Represented by W. S. Campbell, T. W. Delanty and A. P. Schumann. Spaces 953, 955 and 957. Machinery Hall.

St. Louis Car Company, St. Louis, Mo.—Reception booth. Represented by Howard R. Gass, Morrison J. Oswald, Edwin B. Meissner and George L. Kippenberger. Space 364.

Safety Car Heating & Lighting Company, The, New York.—Car lighting equipment complete; electric fans; electric regulating apparatus; electric lighting fixtures. Represented by W. L. Conwell, J. H. Rodger, J. S. Henry, W. L. Garland, G. H. Scott, H. K. Williams and C. W. T. Stuart. Space on stairway platform.

Safety Emery Wheel Company, The, Springfield, O.—Grinding wheels; grinding machinery; safety devices. Represented by Robert K. Noble, Harry G. Bennett, Herman G. Weinland, William H. Vance and Charles G. Smith. Spaces 816 and 818. Machinery Hall.

Sargent Company, Chicago, Ill.—Three-face water gage; two-seat gage cock; safety water glass gaskets; water column complete; Loedige quick acting blower valve. Represented by Louis L. Schultz and Geo. H. Sargent. Space 600.

Schaefer Equipment Company, Pittsburgh, Pa.—Brake hangers; bottom connections; brake levers; brake rod jaws. Represented by Frederic Schaefer, S. M. Hindman, H. G. Doran, F. A. Barby, T. F. Dwyer, W. E. Cade, Jr., and E. J. Searles. Space 511.

Schatz Manufacturing Company, The, Poughkeepsie, N. Y.—Steel casting, motor driven, triple combination punches and shears, lever-operated punches and shears. Represented by H. A. Schatz, B. F. Barnwall and Lawrence Schmidt. Space 961. Machinery Hall.

Scullin Steel Company, St. Louis, Mo.—Freight car truck with elevated end springs; box type truck bolster cut on longitudinal center line, one-half exhibited; channel section truck side frame cut on longitudinal center line, front half exhibited; rear portion of journal box, upper corners bevelled, including dust guard part; model of positive locked, boltless type pedestal frame and journal box; standard rolling mill products. Represented by G. L. L. Davis, Frank L. Norton, George S. Chiles, H. E. Doerr, W. L. Jeffries, Jr., Brownrigg L. Norton, B. W. Parsons, P. J. McCullough and E. S. Wortham. Space 228.

Scully Steel & Iron Company, Chicago.—Draper flue welder; Campbell nibbling machine; tube expander; tube cutters; boiler makers' tools. Represented by John W. Patterson and A. D. F. Simmons. Space 311.

Sellers & Co., Inc., William, Philadelphia, Pa.—Class K non-lifting injector, 2-1/4 inch top check and stop valve; steel bronze coupling and hose nuts; safety squirt; drifting valve. Represented by Strickland L. Kneass, John D. McClintock, Edward L. Holljes, Phillip E. Raymond and James R. New. Space 627.

Service Supply Corporation, Philadelphia, Pa.—MacLeod tire heaters; Conneaut shovels; Whitman and Barnes drills; Buckeye jacks. Represented by Harry E. Shaw and G. B. Tiffany. Space 327.

Sherwin-Williams Company, The, Cleveland, O.—Pan exhibits of Opex lacquer and undercoaters for coach and car painting. Represented by Fred A. Elmquist, John Schlitz, John A. Karb and A. H. Kennedy. Space 213.

Simmons-Boardman Publishing Company, New York.—Railway Age, Railway Mechanical Engineer, Railway Electrical Engineer, Railway Engineering and Maintenance, Railway Signaling, Marine Engineering and Shipping Age, The Boiler Maker, Car Builders Cyclopaedia, Locomotive Cyclopaedia, Maintenance of Way Cyclopaedia; books on transportation subjects. Represented by E. A. Simmons, S. O. Dunn, Roy V. Wright, C. B. Peck, E. L. Woodward, R. C. Angur, H. C. Wilcox, M. B. Richardson, L. R. Gurley, J. C. Emery, D. A. Steele, H. B. Foster, A. G. Oehler, C. J. Corsey, A. E. Orthlinghaus, E. A. Rehm, L. Mizer, L. B. Sherman, Henry Lee, C. R. Mills, F. H. Thompson, George Slate, F. C. Koch, J. G. Little, R. E. Thayer, J. M. Rutherford, F. J. Fischer, H. H. McVillie, H. B. Bolander, J. A. Miller, R. F. Duysters, H. E. McCandless, J. E. Anderson, Paul Traeger, A. Goebck, R. E. Parlen, T. C. Browne and R. S. Mennie. Space 1.

Simplex Wire & Cable Company, Boston, Mass.—"Tirex" car lighting cables and insulated wires and cables for railway use; "Tirex" rubber armored wires and cables of the new Selenium rubber construction. Represented by C. J. Zeigler. Space 159.

- Six-Wheel Company, The, Philadelphia, Pa.—New model 57 truck chassis; new type parlor car body on model 64 bus chassis. Represented by C. M. McCreery, C. E. Dwyer, A. P. Warner, G. P. Williams, P. B. McGinnis, J. L. Schulze, Jr., W. A. Smith, H. E. Fannon, H. E. Myers and J. R. Mickel. Spaces 21 and 23. Motor Transport Exhibit.
- S K F Industries, New York—Ball and roller bearings; journal boxes; models showing anti-friction properties of ball and roller bearings. Represented by W. L. Batt, S. B. Taylor, R. H. DeMott, H. E. Brunner, J. Tawresy, Ben Taylor, John Taylor, Harry Allen and R. C. Byler. Spaces 99 and 101.
- Skinner Chuck Company, The, New Britain, Conn.—Chucks. Represented by A. A. North, A. E. Thornton and R. B. Skinner. Space 932, Machinery Hall.
- Southern Wheel Company, Pittsburgh, Pa.—A. R. A. double plate chilled iron wheels; latest A. R. A. single plate wheels; pair of 850-lb. A. R. A. double plate wheels mounted on an axle, which wheels have been in service on the Pittsburgh & Lake Erie since 1917. Represented by William F. Cutler, Frank C. Turner, J. B. Spencer, C. M. Bower, J. F. Wiesbrod, S. C. Watkins, O. W. Spencer and C. C. Cox. Spaces 508 and 510.
- Southwark Foundry & Machine Company, Philadelphia, Pa.—Scale test car; hydraulic valves; hydraulic leather packings; moving picture machine will demonstrate the Southwark line of products. Represented by J. H. Wood. Space 100, and on track.
- Special Bolt Machinery Corporation, New York—Six-spindle combined turning and threading machine equipped for finishing all types of staybolts used in a locomotive boiler; semi-automatic valve finishing machine for lapping wearing surfaces on triple and other valves used in air brake equipment; two models adapted to cover special conditions. Represented by Walter H. Foster, H. L. Kenah and B. D. Jackson. Spaces 851 and 853. Machinery Hall.
- Standard Car Truck Company, Chicago—Barber lateral motion device; Barber side bearings. Represented by L. W. Barber, F. L. Barber, E. W. Webb, James T. Milner, Robert E. Frame and A. C. Deverell. Space 502.
- Standard Coupler Company, New York—Sessions-Standard draft gears; Goodwin side bearings. Represented by Douglas I. McKay, E. G. Goodwin, E. F. Pride, A. D. Morrow, Joseph M. Welles and George N. Orr. Space 500.
- Standard Railway Equipment Company, Chicago—See Union Metal Products Company. Spaces 426 and 428.
- Standard Steel Works Company, Philadelphia, Pa.—Crank axle. Represented by Richard Sanderson. Space 625.
- Standard Stoker Co., Inc., Chicago—duPont-Simplex Northern Pacific type B stoker; duPont-Simplex type B standard stoker model. Represented by W. C. Peyton, W. D. Gray, F. P. Roesch, Henry S. Mann, R. J. Schlacks, F. C. Pickard, M. C. M. Hatch, W. R. Williams, W. A. Durkee and R. I. Belknap. Space 232.
- Standard Tank Car Company, Sharon, Penna. Tank Car. Track.
- Starrett Company, The L. S., Athol, Mass.—Mechanical tools; hacksaw blades; steel tapes; railroad vises. Represented by David Findlay, Arthur H. Starrett, David Moffat, W. J. Greene and H. J. Davidson. Space 85.
- Stucki Company, A., Pittsburgh, Pa.—Roller side bearings. Represented by A. Stucki and A. B. Severn. Space 537.
- Studebaker Corporation of America, The, South Bend, Ind.—20-passenger parlor car; 21-inch street car type; 18-inch side entrance parlor car. Represented by Charles H. Wondries, Paul H. Castner, Paul R. Davis, Clinton H. Miller and H. V. Loveland. Space 20.
- Sullivan Machinery Company, Chicago—Sullivan motor driven angle compound air compressor, 620 cu. ft. capacity; straight line WG-6 compressor; HA-3 portable compressed air hoist; Turbinair (Sullivan) portable compressed air grinder. Represented by H. C. Sargent, E. F. Pie, L. R. Chadwick, O. R. Cundy and R. B. Hosken. Spaces 859 and 861. Machinery Hall.
- Sunbeam Electric Manufacturing Company, Evansville, Ind.—Locomotive headlights; headlight turbo-generator, train control turbo-generator; locomotive accessories. Represented by C. W. Marshall, W. T. Manogue and J. Henry Schroeder. Spaces 321 and 323.
- Superheater Company, The, New York—Elesco feedwater heater; Elesco exhaust steam injector; Superheated steam pyrometer; Elesco stationary superheater. Represented by George L. Bourne, F. A. Schaff, R. M. Ostermann, H. B. Oatley, G. E. Ryder, C. H. True, Bard Browne, N. T. McKee, R. R. Porterfield, C. A. Brandt, J. K. Scott, W. A. Buckbee, E. A. Averill, George Fogg, S. MacDonald, J. E. Mournie, C. A. Odell, K. E. Stilwell, R. J. Van Meter, A. C. McLachlan and L. H. A. Weaver. Spaces 422 and 424.
- Superior Steel Castings Company, Benton Harbor, Mich.—Steel and malleable iron castings. Represented by S. W. Midgley. Spaces 38 and 42.
- Swift Electric Welder Company, Detroit, Mich.—No. 35 Swift electric flue welding machine. Represented by Floyd E. Taylor. Spaces 953, 955 and 957. Machinery Hall.
- Swind Machinery Company, Philadelphia, Pa.—32 in. Cincinnati Climax shaper; No. 250 Giddings & Lewis firebox drill; 24-inch Bradford high duty lathe; No. 4 Ohio heavy duty plain miller. Represented by L. H. Swind, W. J. Power, R. W. Burk and G. Helling. Spaces 838, 840 and 842. Machinery Hall.
- Symington Company, The, New York—Journal boxes; articulated journal box lid; Symington-Aseo journal box lid; swivel butt coupler; freight car slack adjuster; Farlow draft gear attachments. Represented by C. J. Symington, R. H. Gwaltney, Hynes Sparks, A. E. Hefelfinger, Bruce M. Jones, I. O. Wright, B. W. Kadel, C. R. Naylor, H. J. Smith and Herbert Cook. Spaces 130 and 132.
- Talmage Manufacturing Company, The, Cleveland, O.—Ash pan; ash pan cleaner; ratchet hand brake; steam chest and cylinder lubricating drifting valves; blow-off valve; Cleveland, low water alarm. Represented by F. M. Roby and H. B. Thurston. Spaces 354 and 356.
- Templeton, Kenly & Co., Ltd., Chicago—Simplex car and coupler jacks; Simplex push and pull jacks. Represented by C. A. Crane, Jr., G. L. Mayer and William Simpson. Space 536.
- Thompson Company, E. J., Pittsburgh, Pa.—90-inch 26-passenger observation body mounted on Mack 230-1/2-inch wheelbase chassis; Observation club car body mounted on Yellow "Y" type chassis exhibited by Yellow Truck & Coach Manufacturing Company. Represented by E. J. Thompson and A. R. Hopkins. Space 9. Motor Transport Exhibit.
- Thomson Electric Welding Company, Lynn, Mass.—Electric flue welder with finishing roll; electric spot welder. Represented by H. B. Warren, R. S. Donald, F. H. Leslie and George Lind. Spaces 960 and 962, Machinery Hall.
- Timken-Detroit Axle Company, The, Detroit, Mich.—Motor coach and motor truck axles cut away so as to show how worm gearing operates in (1) single drive motor coach axles; (2) single drive motor truck axle; (3) dual axles, such as used under six-wheel vehicles; (4) dual drive, two-carrier axle, without mechanical differential, used in two-motor, gas-electric vehicle. Represented by H. W. Alden, Fred Glover, D. S. Devor, P. W. Hood, W. L. Love, P. W. Sloan, Ralph Trese, C. S. Dahlquist, L. W. Fischer, Geo. E. Fox, Wm. Bonn, Rex S. Gay and Fred Egolf. Space 1, Porch, and Space 2, Motor Transport Exhibit.
- Timken Roller Bearing Company, Canton, O.—Railway trucks equipped with Timken bearings; various machine tool bearing applications; J. G. Brill truck equipped with Timken bearings. Represented by M. T. Lothrop, T. V. Buckwalter, H. J. Porter, W. C. Souders, J. W. Spray, L. M. Klinedinst, E. W. Austin, S. C. Merrill, S. M. Weckstein, and P. C. Poss. Space 142.
- Transportation Devices Corporation, Indianapolis, Ind.—Mechanical cut-off control; cut-off indicator; power reverse gear; superheater unit grinder; bell ringer. Represented by L. D. Grisbaum, F. H. Lutz and E. S. Pearce. Space 143.
- Tuco Products Corporation, New York—Flexolith composition flooring; Tucork car floor insulation; Tuco Rockwul jacket insulation for tank cars; Tuco Resisto car insulation for superstructure; Tuco National standard roofing; Tuco National steel trap doors and fittings; Tuco Royal adjustable car window screens; Tuco Reliance sash balances; Tuco Eclipse deck sash ratchets. Represented by D. W. Pye, T. L. Miller, R. F. O'Leary, E. J. Cochran and H. B. Chamberlain. Space 629.
- Tyler Tube & Pipe Company, The, Washington, Pa.—Charcoal iron in various forms. Represented by E. Tyler Davis and James R. Eriser. Space 87.
- Ulster Iron Works, Dover, N. J.—Ulster special staybolt iron; special drilled hollow staybolt; engine bolt iron. Represented by H. A. Gray, J. C. Campbell, N. S. Thulin, H. T. Bradley, S. E. W. Kavanagh, J. H. Craigie, C. F. Barton and L. E. Hassman. Space 86.
- Underwood Corporation, H. B., Philadelphia, Pa.—Portable boring bar equipment for cylinders and valve chambers; two types of crank pin turning machine; locomotive cylinder or dome facing machine; pedestal milling machine; valve seat rotary planer. Represented by F. H. Schonberger. Spaces 380 and 381.
- Union Asbestos & Rubber Company, Chicago—Asbestos; packings; sectional pipe covering; gaskets. Represented by L. L. Cohen, J. H. Kuhns, W. R. Gillies, G. J. Martin and O. H. Neal. Space 374.
- Union Carbide Sales Company, New York—Oxweld railroad lamp. Represented by J. D. Swain, H. E. Meagher, W. A. Wadsworth, Gilbert Bogart, J. J. Saelens and J. L. Frazer. Space 73.
- Union Draft Gear Company, Chicago—Cardwell friction draft gear. Represented by J. R. Cardwell, L. T. Canfield, H. Barnard, J. E. Tareyton, J. A. King, R. W. Schulze, W. Eckles, O. C. Heckort, J. W. Bridge, C. A. Danielson, A. Lerch and F. E. Schmitz. Spaces 413 and 415.
- Union Metal Products Company, Chicago—Murphy corrugated steel end; Fowler upper buffer springs; Murphy corrugated automobile end door; Murphy Radial all-steel flexible roof; Ajax corrugated doors; Murphy all-steel flexible roof; Union centering device; Murphy pivoted outside metal roof; Improved Carmer release rigging; Murphy solid steel roof; type "B" release rigging; Z. U. carlines. Represented by A. A. Frank, S. G. Rea, A. S. Merz, D. R. Arnold, A. G. Bancroft, G. G. Gilpin, J. T. Cralley, J. H. Schroeder and C. D. Bonsall. Spaces 426 and 428.
- Union Railway Equipment Company, Chicago—"Ureco" ratchet hand brakes; high power hand brakes; drop brake shafts; pressed steel well traps; coupler release rigging; self-locking refrigerator car door hinge. Represented by W. B. Hall, A. F. O'Connor, J. A. Galligan and G. E. Coffey. Space 131.
- Union Refrigerator Transit Company, Milwaukee, Wis. Refrigerator Car. Track.
- Union Spring & Manufacturing Company, Pittsburgh, Pa.—Reception booth. Represented by H. C. Bughman, Jr., J. W. Chandler, W. L. Jefferies, Jr., W. F. McCabe, A. Pancoast, F. E. Schaeffer, D. R. Warfield and A. C. Woods. Space 559.
- United Alloy Steel Corporation, Canton, O.—"Toncan" tubes; staybolts and firebox plate. Represented by George T. Ramsey, A. W. Minuse, J. G. Bell and A. L. Roberts. Spaces 368 and 369.
- U. S. Metallic Packing Company, The, Philadelphia, Pa.—King packing; King sanders; King oil cups; Security shaker bar; Schlacks force feed lubricator; factory trucks and industrial trailers. Represented by E. Curtiss, R. A. Light, J. T. Luscombe, H. E. Hyslop, J. S. Mace, L. B. Miller, O. J. Rudolph, D. C. Thomas, J. C. Weedon and R. H. Powell. Spaces 568 569 and 657.

- United States Rubber Company, New York.—Reception booth. Represented by G. A. Gardner, L. S. Hungerford, Jr., F. E. Dodson, R. B. Smith and A. B. Means. Space 7.
- Universal Draft Gear Attachment Company, Chicago.—Friction draft gear and attachments; hand brake attachments; truck column anchors; brake beam safety hangers; draft key retainers; reinforcing draft arms. Represented by P. B. Camp, H. E. Bartach, C. J. Nash and H. I. Wrigley. Space 513.
- Universal Generator Company, Blossburg, Penna. Space 165.
- Universal Packing Corporation, Pittsburgh, Pa.—Automatic flange reducer; "Durametallic", a flexible all-metallic packing for locomotives; economy locomotive grease cup. Represented by J. J. McQuillen, Herbert Lewis, J. M. Bandish and Leon Sliter. Space 113.
- Universal Packing & Service Company, Chicago.—Spring journal box packing. Represented by J. P. Landreth, W. H. Davis, J. D. Herr. Space 117.
- Valentine & Co., New York.—Steel passenger car section finished with Nitro-Valapar (nitrocellulose) finish; steel panels showing different car finishes. Represented by I. H. Munford and M. deC. Freeman. Space 357.
- Vanadium-Alloys Steel Company, Latrobe, Pa.—High speed, carbon and alloy tool steels; fractures showing various treatments; tools showing representative uses of the different steels. Represented by R. C. McKenna, E. L. Moberg, J. P. Gill, L. D. Bowman, J. H. Roberts, W. R. Mau, R. R. Artz, F. W. Potts and J. A. McKay. Spaces 376 and 377.
- Vanadium Corporation of America, New York.—Specimens of ferro alloys and ores; steel fractures; distorted Vanadium steel coil springs. Represented by J. A. Miller, Jr., Geo. L. Norris and Charles Fritz. Spaces 11 and 13.
- Vapor Car Heating Company, Inc., Chicago.—Vapor system hand operated and automatic temperature control; flexible metallic conduits; end valves; steam couplers; locomotive car heating specialties; hot water heating specialties; steam heat fittings. Represented by E. H. Gold, J. E. Buker, N. F. Burns, H. D. Donnell, L. H. Gillick, P. B. Parks, H. F. Bowman, L. B. Rhodes, W. L. Garland, F. A. Purdy, R. P. Cooley, W. H. Tucker, C. E. Lowell and A. F. Retta. Spaces 208, 210, 212, 214 and 216.
- Viloco Railway Equipment Company, Chicago.—"Viloco" improved sander equipment; "Crescent" metallic packing; "Viloco" bell ringer, automatic rail washer, uncoupling lever attachment, brake step and automatic sand dryer. Represented by G. S. Turner, Chas. R. Long, Jr., A. G. Hollingshead, J. M. Monroe, W. H. Heckman, J. S. Lemley and S. W. Russell. Space 576.
- Vulcan Electric Brazier & Welder Company, Paterson, N. J.—Electric band saw brazier. Represented by Carl Hakemeyer and E. Herklotz. Space 171.
- Walker Draft Gear Corporation, New York.—Friction draft gear. Represented by Edmund H. Walker. Space 544.
- Walraven Company, The, Atlanta, Ga.—Marsh portable crank-pin turning machine. Represented by J. R. Walraven and C. E. Marsh. Space 162.
- Walworth Company, Boston, Mass.—Testing machine showing method of testing Kewanee Unions by compressed air, including one Kewanee regrinding valve which has been opened and closed 18,273,706 times and is still in use; Walworth Sigma Steel fittings and valves for high pressure and high temperature service; Walworth tools; exhibit showing the various stages of the manufacture of a Walworth Stillson wrench from the steel bar to the finished product; exhibit showing the manufacture of the Kewanee union; Walworth valves and fittings for railroad service. Represented by P. B. Miller, William J. Moran, J. A. Ellis, W. C. Mattox and L. F. Hamilton. Space 412.
- Warner & Swasey Company, The, Cleveland, O.—New No. 3-A turret lathe, 7½-in. capacity; No. 2-A Universal hollow hexagon turret lathe; W. & S. portable pneumatic tools, including new type D-1 and D-3, cutting on steel castings. Represented by E. R. Gardner, W. L. Loegler, K. L. Pohlman, C. J. Stilwell, F. B. Castle, J. A. Craig, A. C. Cook and G. Kochenderfer. Spaces 933 and 935, Machinery Hall.
- Watson Stillman Company, The, New York.—Walter Stock hydraulic adjusting machine with vertical two-plunger pump; Riley hydraulic axle straightener with pump; 30-ton hydro-pneumatic telescopic ram pit jack; 100-ton hydro-pneumatic bushing press; 50-ton hydraulic laboratory press; 40-ton hydro-screw jacks; National train indicator; valves and fittings. Represented by E. A. Stillman, Wm. J. Waters, W. A. Kelly, H. D. Nitchie, E. L. Breaden, W. B. Updegraff, R. C. Howell, S. H. Ford and Walter Stock. Spaces 837, 839 and 841, Machinery Hall.
- Waugh Equipment Company, Chicago.—Waugh draft gears; Gould draft gears; Waugh-Gould draft gears; Waugh platform buffers, Gould platform buffers; Gould pilot beams; Peerless side bearings; Paragon side bearings; Chaffee centering devices; Waugh tank car outlet valves. Represented by R. J. O'Brien, R. C. Munro, W. H. Bentley, W. H. S. O'Brien and H. D. Page. Space 138.
- West Disinfecting Company, Chicago.—Sanitary appliances. Represented by H. E. Daniels and E. C. Daniels. Space 26.
- Western Railway Equipment Company, St. Louis, Mo.—"Interlox" floor clips; "Interlox" brake mast ratchets; A. R. A. "Standard + Plus" journal wedges. Represented by Louis A. Hoerr, Roland M. Hoerr and S. H. Campbell. Space 618.
- Western Tool & Manufacturing Company, The, Springfield, O.—Tool holders; expanding mandrels; portable vise stand; emery wheel dresser; shop furniture; safety dog. Represented by Henry Morris and J. Z. Wells. Space 650.
- Westinghouse Air Brake Company, Wilmerding, Pa.—Automotive brakes for buses and trucks, demonstration exhibit; friction draft gear; new type M feed valve; centrifugal dirt collector (demonstration); air compressors; packing rings, Wabco packing cups and gaskets. Represented by A. L. Humphrey, S. G. Down, G. W. Wildin, C. R. Ellicott, C. C. Farmer, J. C. McCune, O. J. Olmstead, R. Burgess, R. W. Williams, H. S. Clark, C. H. Beck, E. W. Davis, C. D. Foltz, J. B. Wright, H. D. Hukill, H. B. Gardner, E. R. Fitch, J. S. Y. Fralich, T. W. Newburn, F. H. Parke, F. C. Young, S. L. Poorman, H. A. Wahlert, V. Villette, J. R. Bartholomew, G. H. Martin and F. H. Whitney. Spaces 27, 29 and 100.
- Westinghouse Air Spring Company, New Haven, Conn. Space 161.
- Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.—Demonstration of automatic electric arc welding; operating display of tachometers and speed indicators as applied to locomotives and private cars; several latest types of control; new chromium plated reflectors used in new type of aluminum floodlights; safety switches; SK motor and a cutaway scaled sleeve bearing; instruments of interest to railroads; new DI brake mounted upon a turntable motor. In cooperation with the Brill Company, standard 60-ft. gas-electric car and a 73-ft. gas-electric car built for the New York, Ontario & Western. New quill link drive for electric locomotives removed from New York, New Haven & Hartford locomotive for exhibition. Represented by K. A. Simmon, W. W. Reddie, T. C. Wurts, A. L. Schieber, W. L. Healey, H. H. Lupinski, H. H. Wentworth, T. R. Langan, B. L. Clegg, Mark Dawson, Thomas Cooper, C. A. Bercar, Jack Ross, C. C. Gray, W. O. Peale, A. S. Wentworth, J. C. McLaughlin, J. C. McQuiston, P. H. Grunnagle and Lesley C. Paul. Spaces 23, 25, 94, 96 and 98.
- Westinghouse Friction Draft Gear Company, Pittsburgh, Pa.—Types NY-10; NZ-10, and N-11-A friction draft gears. Represented by Harold B. Gardner. Space 29.
- Wheel Truing Brake Shoe Company, Detroit, Mich.—Abrasive brake shoes for truing up car wheels and locomotive driving wheels. Represented by J. M. Griffin, F. F. Griffin and Fred H. Scott. Space 507.
- White Company, The, Cleveland, O.—Model 53 small bus chassis; model 50-B bus, fitted with a 29-passenger pay-enter Brown de luxe body; model 50-B, 23-passenger Bender parlor car body; heavy duty truck chassis; Model 51, 2½-ton truck chassis. Represented by Walter C. White, Thomas H. White, G. H. Smith, H. D. Church, M. A. O'Mara, E. J. Speh, F. E. Triebner, Stanley P. Seward, J. W. Spaulding, S. W. Wallace, E. W. Sargent, W. S. Humbert, R. W. Knowles, W. A. Maynard, V. W. Fries, A. R. Saari, H. C. Godden, J. T. Ames and R. C. Snell. Spaces 1, 3 and 5, Motor Transport Exhibit.
- Whitehead & Kales Company, River Rouge, Mich.—Fordson tractor with W&K rubber tired wheels; W&K one-ton Fordson crane; W&K model B shop trailer; W&K street sweeper. Represented by H. L. Wagner. Spaces 703 and 704.
- Whiting Corporation, Harvey, Ill.—Electric drop table; portable car jack; model of locomotive hoist; photographs, drawings, etc. Represented by A. H. McDougall, R. H. Bourne and H. J. Hair. Spaces 75 and 77.
- Willard Storage Battery Company, Cleveland, O.—Standard train-lighting batteries; ARA glass jar signal batteries; train control batteries; rail car batteries; bus starting and lighting batteries; new light weight train lighting batteries. Represented by Louis Sears, C. T. Klug and E. M. Sutherland. Space 34.
- Wilson Imperial Company, Newark, N. J.—Semi-automatic machine for cleaning plush car seats and backs. Represented by D. J. Giles, Frank Sheritt, Chas. Beaumont and E. M. Wilson. Space 200.
- Wine Railway Appliance Company, The, Toledo, O.—Side bearings; drop door locks; ventilators. Represented by Cyrus Hankins, Cyrus J. Holland, E. H. Fisher, George B. Christian, W. F. Cremean, W. E. Wine, L. J. Tillman, and J. T. Tillman, Sr. Space 611.
- Wood Conversion Company, Chicago.—Balsam-Wool refrigerator car insulation; steel passenger car insulation; building insulation; machine reproducing movement of car in motion to show that Balsam-Wool is not damaged by distortion or vibration. Represented by D. H. Corlette and A. H. Furdom. Space 226.
- Wood Iron & Steel Company, Alan, Philadelphia Pa.—Pressed metal work including Livings' projector base, base for air compressor tank, automobile truck housing, truck air ducts, flanges, hubs, gear case, oxygen cylinders, hollow drawn roller, bus frame, etc.; "AW" Diamond Pattern rolled steel floor plates for steps, flooring and platforms; "AW" traffic treads for bridges and railroad highway crossings. Represented by J. R. Jones. Spaces 19, 21, 82 and 84.
- Woods & Co., Edwin, S., Chicago.—Woods antifriction side and center bearings. Represented by W. B. Ross, G. S. Crawford and H. M. Perry. Space 619.
- Worthington Pump and Machinery Corporation, New York.—Locomotive boiler feed pump and feedwater heater. Represented by Thomas C. McBride, F. F. Murray, C. I. Williams, J. E. Buckingham, E. C. Jackson, J. F. Cosgrove, J. M. Lammedee, G. R. Law and D. R. Coleman. Spaces 67, 69 and 71.
- Wyoming Shovel Works, The, Wyoming, Pa.—Locomotive firemen's scoops. Represented by H. T. Potter, Stanley H. Smith, E. L. Ruby and Mr. N. E. Brooks. Space 211.
- Yale & Towne Manufacturing Company, The, Stamford, Conn.—Yale pressed steel crane ends; electric hoists, ball-bearing model; hand traveling cranes, chain block; trolleys; electric industrial trucks. Represented by H. J. Fuller, R. E. Wilson, R. L. Higgins, C. H. Moeller, H. A. White, C. B. Veit, Charles Schroeder, Maxwell C. Maxwell and Walter Randall. Spaces 104 and 106.
- Yellow Truck & Coach Manufacturing Company, Chicago.—Model Y chassis; model Y29 passenger parlor coach; model Y-observation coach; model Z 6-cylinder 29-passenger pay-enter city service coach. Represented by G. A. Green, H. E. Listman, R. E. Fielder, H. S. Hamilton, L. A. Shepard, J. I. Byers and J. J. St. Croix. Spaces 27, 28, 29 and 30.